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NATIONAL DAM SAFETY PROGRAM UNIV. MO. EXP FARM DAM MO NONAME 20--ETC(U)
SEP 78 H M REITZ, J J BAILEY DACW43-78-C-0162
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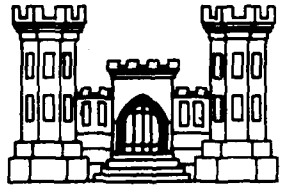
MISSOURI-KANSAS CITY BASIN

NO NAME-207

ST. CHARLES COUNTY, MISSOURI

MO 10643

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



PREPARED BY: U. S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

SEPTEMBER 1978

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.	

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DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 NORTH 12TH STREET
ST. LOUIS, MISSOURI 63101

IN REPLY REFER TO

26 September 1978

SUBJECT: No-Name 207 Dam Phase I Inspection Report

This report presents the results of field inspection and evaluation of the No-Name 207 Dam:

It was prepared under the National Program of Inspection of Non-Federal Dams

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

1) Spillway will not pass 50 percent of the Probable Maximum Flood
2) Overtopping could result in dam failure.
3) Dam failure significantly increases the hazard to loss of life downstream.

SUBMITTED BY: _____ _____
Chief, Engineering Division Date

APPROVED BY: _____ _____
Colonel, CE, District Engineer Date

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
NO-NAME 207 DAM MO. ID NO. 10643

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PHASE I REPORT

NATIONAL DAM SAFETY PROGRAM

Name of Dam	No-Name 207
State Located	Missouri
County Located	St. Charles County
Stream	East Branch Crooked Creek
Date of Inspection	4 September 1978

No-Name 207 dam was inspected by an interdisciplinary team of engineers from Reitz & ~~Jens, Inc.~~ under contract with the St. Louis District Corps of Engineers. The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

The guidelines used in the assessment were furnished by the Department of the Army, Office of the Chief of Engineers and developed with the help of several Federal and State agencies, professional engineering organizations and private engineers. Based on these guidelines, this dam is classified as a small size dam with a high downstream hazard potential. Failure would threaten the life and property of eight families downstream and cause appreciable damage to the U.S. 40TR and Highway 94 interchange, Highway 94 and a village road.

Our inspection and evaluation indicates that the dam is deficient in that the spillways do not meet the criteria set forth in the guidelines for a dam having the above size and hazard potential and which require that the spillway be capable of passing a one-half PMF (Probable Maximum Flood). The probable maximum flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in the region. The dam will begin to be overtopped by a flood having a discharge (peak and volume) equal to 20% of the PMF. The spillways will pass a 1% chance flood (100-year flood) without overtopping, which is a flood that has a 1% chance of being exceeded in any given year.

Other deficiencies found were uncontrolled tree growth on part of the dam, lack of erosion protection on the upstream slope of the dam and a spillway, and the lack of seepage and stability analysis records.

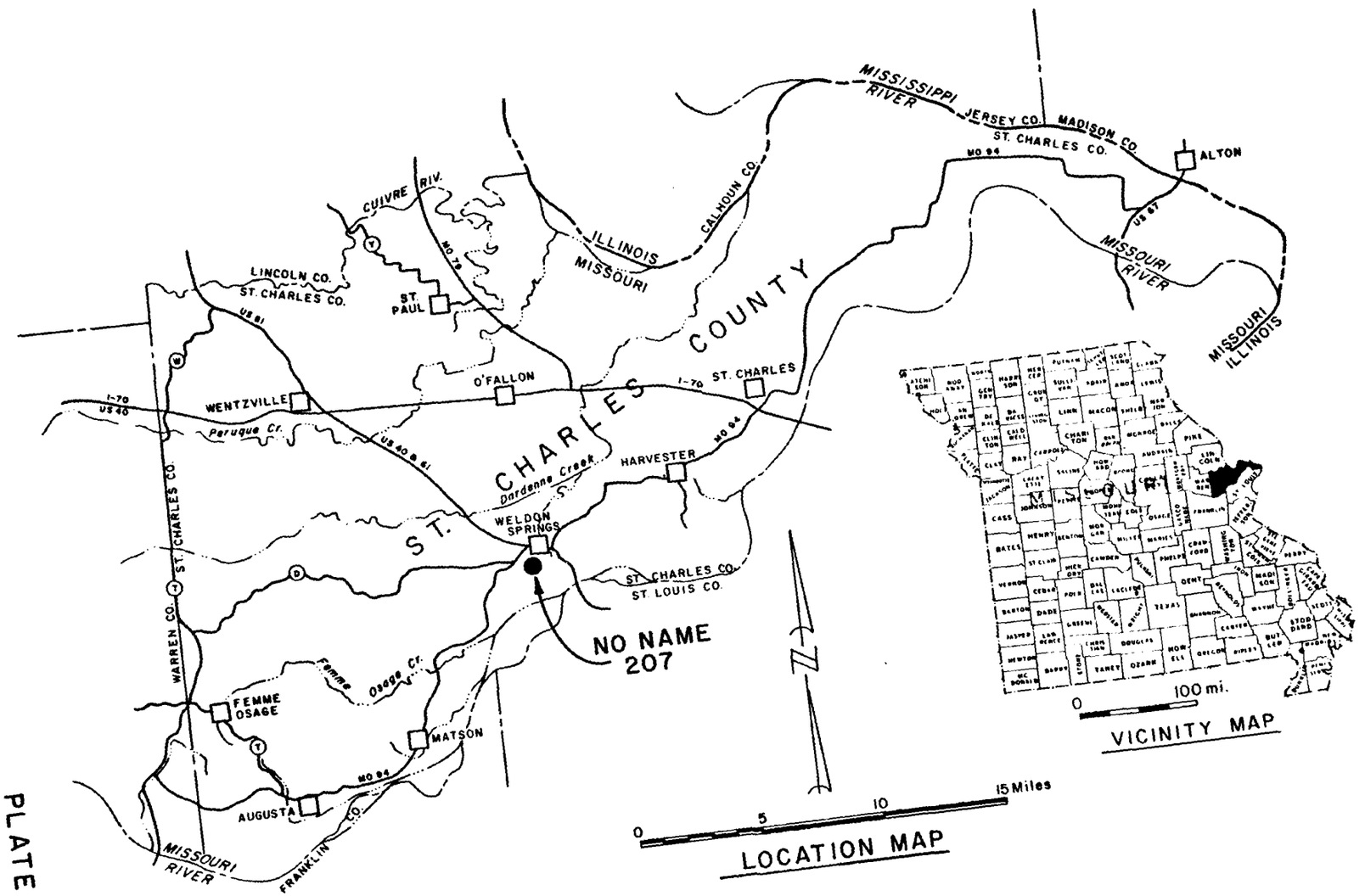
We recommend that the owner take action to correct or control the deficiencies described. A detailed report discussing each of these deficiencies was prepared and submitted to the owner and the Governor of Missouri.

HENRY M. REITZ, President
Reitz & Jens, Inc.

JOHN J. BAILEY, JR., Vice President
Chief Engineer
Reitz & Jens, Inc.

OVERVIEW – 10643

PLATE 1


MISSISSIPPI RIVER
JERSEY CO.
MADISON CO.
ST. CHARLES CO.
ALTON
MO 94
US 67
MISSOURI RIVER
MISSOURI
ILLINOIS
CALHOUN CO.
ILLINOIS
MISSOURI
CUIVRE RIV.
MO 79
LINCOLN CO.
ST. CHARLES CO.
ST. PAUL
US 61
O'FALLON
I-70
ST. CHARLES
WENTZVILLE
I-70
US 40
Peruque Cr.
US 40 & 61
HARVESTER
MO 94
Dardenne Creek
ST. CHARLES COUNTY
WELDON SPRINGS
ST. CHARLES CO.
ST LOUIS CO.
WARREN CO.
ST. CHARLES CO.
NO NAME
207
Femme Osage Cr.
FEMME OSAGE
MATSON
MO 94
AUGUSTA
FRANKLIN CO.
MISSOURI RIVER
N
0
5
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15 Miles
LOCATION MAP
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VICINITY MAP

PLATE 3

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, District Engineer contracted with Reitz & Jens, Inc. (Contract DACW43-78-C-0162) for a safety inspection of the No-Name 207 dam.

b. Purpose of Inspection The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

c. Evaluation Criteria Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, in "Recommended Guidelines for Safety Inspection of Dams". These guidelines were developed with the help of several Federal agencies and many State agencies, professional engineering organizations and private engineers.

1.2 DESCRIPTION OF PROJECT

a. Description of Dam Appurtenances The dam is built in a draw in rolling, upland topography on the headwaters of the east branch of Crooked Creek, close to the divide between Dardenne Creek and the Missouri River hills.

Soils are formed in a loess about 3 to 7 feet thick, overlying glacial till, covering Mississippian Limestone. The Weldon Silt Loam and Silty Clay Loam comprise respectively 25% and 75% of the soils in the watershed with the latter occurring on the gentler, rounded slopes along the watershed ridge.

The slopes in the watershed average 6% to 7%. The Weldon Soils are considered to be in Hydrologic Soil Group "D".

Land use in the watershed is about 80% pasture and 20% in a stripped-crop area on the west side of the reservoir which in the past was irrigated by pumping from the reservoir to grow crops for silage and feed. In the recent past this practice has stopped.

There are two small impoundments, each about 2 acres water surface area, in the headwaters of the watershed. About 5% of the watershed area drains to and through these ponds.

Topography in the vicinity of the dam is shown on Plate 2. The dam is built essentially parallel to the centerline of Highway 40TR running generally in an east/west direction, except at the western end which turns southwest and is nearly parallel to Highway 94. The inspection team obtained a copy of a recent 1"=100' aerial topographic map with 2-foot contours from the Missouri State Highway Department. This shows the dam, part of the lake and the existing highways and interchange north and west of the dam.

There is a spillway at each abutment of the dam. Both of these cross the dam alignment at about a 45-degree angle and are earth channels excavated in virgin soil. The crest of the east spillway is about one foot lower than the west. This spillway was excavated about 140 feet northeastwardly from the dam where it ended on a rather steep slope, draining to a draw which would return discharge to the original channel. A berm was left on the northwest side of this channel but, at some time, this berm was cut about 75 feet from the dam. Any flow over the spillway would initially follow this branch at right angles to the original spillway channel because it is lower and steeper than the main channel.

The western spillway is a narrower and higher cut into the original ground. The crest is 25 to 50 feet downstream from the centerline of the dam. The control section for higher discharges is about at the dam centerline.

Topography in the vicinity of the dam is shown on Plate 2.

Pertinent physical data are given in paragraph 1.3 below.

b. Location The dam is located in south central St. Charles County on the northern part of the University of Missouri Experimental Farm at Weldon Spring in a U.S. Survey in T46N, R3E and, more particularly, is in the southeastern quadrant of the interchange between State Highway 94 and State Highway 40TR and is about 1/4-mile south-southwest from the Village of Weldon Spring. The lake formed by the dam is shown on the 1968 revision of Missouri-St. Charles-St. Louis County-Weldon Spring Quadrangle Sheet, 1954 Edition. A portion of this sheet is reproduced on Plate 2. Since publication of the sheet, Highway 94 has been relocated. The new alignment has been endorsed on Plate 2. Location and Vicinity maps are shown on Plate 3.

c. Size Classification Criteria for determining the size classification of dams and impoundments are presented in the guidelines referenced in paragraph 1.1.c above. Based on these criteria, this dam and impoundment are in the small size category.

d. Hazard Classification Guidelines for determining hazard classification are presented in the same guidelines referenced in paragraph c above. Based on referenced guidelines, this dam is in the high hazard classification.

e. Ownership The dam is owned by the University of Missouri. Mr. Dale O. Bowling, Vice President, University of Missouri Business Management, 225 University Hall, Missouri University at Columbia, Columbia, Mo., 65201, has administrative responsibility for the property. The local manager is Bill Schwendemann at University of Missouri Farm, Route 2, St. Charles, Mo., 63301.

f. Purpose of Dam This dam forms a water supply lake for irrigation of 58 acres on the west bank of the reservoir. Although the area of lake surface at spillway crest elevation would be 50 acres, the lake level appears to remain about 11 feet below the spillway crest. The lake area at this lower elevation is about 26 acres.

g. Design and Construction History The inspection team was unable to find any design data on this dam. It was reported, by the person responsible for management of the farm at the time, that construction on the dam began in 1957 and water impoundment commenced in 1958. He further stated that the dam was constructed by University forces using a rubber-tired "Hi-Liner" scraper according to a design by a University Agricultural Engineer and with his advice during construction. By 1961, within three years of completion according to the manager at that time, a home owner in the Village of Weldon Spring complained that his well was running muddy. "University personnel made a dye test and concluded that the water in wells in Weldon Spring was not coming from the University's lake".

h. Normal Operating Procedure Normal rainfall, runoff, transpiration, and evaporation all combine to maintain a relatively stable water surface elevation. The maximum water depth ever experienced at the spillway is unknown, although the source quoted in paragraph g above also stated that so far as he knew, the lake had never been full to the spillway elevation. Mr. Schwendemann, his successor and the farm manager for the last 12 years, made a similar assertion. Observations by the inspection team appear to contradict these recollections, see paragraphs 3.1.c and 3.1.e.

1.3 PERTINENT DATA

a. Drainage Area - 300 acres

b. Discharge at Damsite

(1) All discharge at the damsite is through uncontrolled spillways. It was reported to the inspection team that a 2-inch steel pipe with a valve on the lower end was placed through the dam to allow withdrawal of irrigation water in accordance with standard University practice when the dam was built but this has never been used and its location is presently unknown.

(2) Estimated experienced maximum flood at damsite - unknown.

(3) Estimated ungated spillway capacity at maximum pool elevation -
(a) East Spillway - 55 cfs
(b) West Spillway - 150 cfs
(c) Total 205 cfs

c. Elevation (Feet Above M.S.L.)

(1) Top of dam - 579.2 to 582.0 (see Plate 2).

(2) Spillway Crest - 577.3 East; 578.4 West.

(3) Streambed at centerline of dam - 550±

(4) Maximum Tailwater - unknown.

d. Reservoir Length of maximum pool - 3200 feet ± (estimated from USGS Map).

e. Storage (1) Top of dam - 727 acre feet.
(2) Spillway crest - 627 acre feet.

f. Reservoir Surface

(1) Top of dam - 55.6 acres (estimated from USGS Map).

(2) Spillway Crest - 50.2 acres (estimated from USGS Map).

g. Dam

(1) Type - earth embankment

(2) Length - 900 feet

(3) Height - 33 feet maximum (from field survey).

(4) Top width - 25 feet

(5) Side Slopes -

(a) Downstream - 1V on 3H (determined from field measurement)

(b) Upstream - 1V on 3H (to existing water surface 13 feet below top of dam).

(6) Zoning - unknown

(7) Impervious core - unknown

(8) Cutoff - Farm manager who was in charge of construction reported that this was very good, wide and deep, but did not extend all the way up the abutments of the dam.

(9) Grout curtain - unknown

h. Diversion and Regulating Tunnel - None

i. Spillways

(1) East crest elevation 577.3. Flat bottom 20 feet wide, 140-foot long channel from dam centerline with 4 to 1 slope on dam side and 16 to 1 on abutment. Channel flat for 75± feet to branch at 90° which drops steeply down valley slope below dam.

(2) West crest elevation 578.4. Flat bottom 10 to 15 feet wide with 20 to 1 slope on dam side and 8 to 1 slope on abutment. Less than 50 feet long. Discharges to highway ditch.

j. Regulating Outlets - Possible 2-inch pipe and valve (see paragraph 1.3b(1).)

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

No design data were found to be readily available. (See paragraph 1.2g.) It was reported to the inspection team that the dam was designed by Marion Clark, an agricultural engineer who is no longer associated with Missouri University.

2.2 CONSTRUCTION

The dam was constructed in 1957 and 1958. No construction records were found to be readily available. What are believed to be reputable recollections of the person in charge are set out in paragraph 1.2g.

2.3 OPERATION

With the possible exception of the valve described in paragraph 1.3b(1) there are no facilities requiring operation.

2.4 EVALUATION

a. Availability No design construction or operation records were found to be readily available. A thorough search of the University archives was not performed.

b. Adequacy Engineering data not being available, no detailed assessment of the design, construction and operation could be made. The owner should have an engineer experienced in the design of dams perform detailed seepage and stability analyses.

c. Validity No valid engineering data on the design and construction were avilable.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General A visual inspection of the No-Name 207 dam was made on 4 September 1978. This followed 3 days of field measurements by a survey party on 21, 22 and 23 August 1978. The training and experience of personnel in these inspections included hydrologic/hydraulic engineering, soils and materials engineering, surveying and structural engineering. This section only states those aspects visually observed during the inspections. It does not comment upon items reported to have been installed but which were not evident during August and early September.

Discussions with personnel of Missouri University School of Agriculture concerning design and construction of the dam and reservoir are summarized in paragraphs 1.2g and 1.3b(1).

b. Dam The dam is an earth dam; top width ~ 25+ feet (photos D-2, D-7); downstream slope - 1V:3H; upstream slope - 1V:3H down to the lake surface. The height is 33 feet, length approximately 900 feet. The elevation of the top of dam varied approximately 2½ feet with the high point over the deepest part of the fill and the low point near the west end of the embankment. There is no erosion protection on the reservoir side of the dam (D-1, D-3, D-8, D-9). There is some vertical wash at the lake level as viewed during the inspections (D-3, D-9). The slope above the wash height of approximately one foot was grass-covered. The downstream slope was also grass-covered (D-4, D-5). The west two-thirds of the dam was relatively free of anything other than grass one foot more or less in height. There is a tree at about the waterline at the east third point (D-9) and the downstream slope on the east third of the dam has become established with rampant underbrush and tree growth (D-6, D-10, D-11, D-12). Inspection of the downstream slope of the dam and the contiguous areas beyond the toe of the dam indicated neither the growth of hydrophilic plants nor any soft, wet areas nor the even greater degree of free water at the surface. As such, there was no sign of through seepage on the dam. Neither was there any sign of underseepage along the contact between the toe of dam and original ground surface.

c. Spillways No evidence of a low level outlet pipe was found on the downstream toe (see paragraph 1.3b(1). The control elevation on the east spillway (S-2, S-3, S-4, S-5) which is the larger, is about one foot lower than the control elevation on the west spillway. Both these spillways are in virgin soil and excavation in the spillways apparently was used to build the dam. In addition, it appeared to the inspection team that the east spillway, which for its considerable width is also a long, very flat channel, has at times due to its length and hydraulic resistance which this created, had water overtop the north berm along the originally prepared spillway alignment and that this overflow has eroded a channel (S-4, S-6, S-7, S-8) down the steeper gradient. This eroded path would be the first portion of the spillway system to discharge overflow. This observation appears to contradict the recollections of the farm managers, see paragraph 1.2.b. The profile of the eroded gradient is shown as the northwest branch of the east spillway on Plate 3.

d. Reservoir On the reservoir side of the dam there has been some wave-wash erosion at the water surface (D-8, D-9, P-4). On the east shore of the reservoir, for a length approximately 75 yards centered about 100 yards from the centerline of the dam, there is a vertical face of soil about one foot high with base ranging from 2 to 3½ feet above the lake level (P-7, P-9, P-10). This is a virgin soil location. It appears this vertical face is the result of wave-wash under high winds. This does not, in any way, endanger the integrity of the dam or spillways. On the west shore of the lake (P-1, P-4) for a length of approximately 40 yards starting in the virgin material at the west side of the west spillway there is a generally similar earth face approximately vertical with a height of 2 feet but with base approximately 1/2 to 1 foot above the lake level. This also appears to be wave action but due to the less frequent easterly winds from the prevailing westerlies and also to the somewhat shorter fetch, the height of the top of the erosion above the lake is less. On this west valley slope there are several eroded gullies (P-1, P-4) perpendicular to the wave-wash face. These gullies are unsightly. They are the result of overland flow off the longer slope to the west. Neither the wave-wash nor these eroded gullies in any way endanger the integrity of the dam and spillways. Effect of sediment accumulation on the reservoir is negligible.

Despite the absence of a visible low level outlet at the time of the inspections the surface of water in the lake was approximately 11 feet below the lowest elevation of the lower spillway. Leakage from some part of the project obviously occurs because for the precipitation of the previous three years, runoff should have raised the reservoir surface, at least to the east spillway elevation. A loss of more than 11 feet within three years far exceeds evaporation losses that could occur. Irrigation withdrawals have not been made for several years, since the University quit running its own cattle herd. A verbal recollection of this project (see paragraph 1.3g)indicated there had been complaints when the reservoir was first filled of muddiness appearing in local wells downslope. The absence of any indications of through-seepage or underseepage downslope from the dam (see paragraph 3.1b)above, suggests that loss of water is from the bottom and/or sides of the reservoir directly into some exposed rock or through a pervious soil cover.

e. Downstream Channels When the interchange at 40TR and Highway 94 was built, the right-of-way line was established 10 feet from the toe of the east/west portion of the dam. Proceeding downslope, within about 15 feet of this right-of-way line, is the toe of the embankment carrying the south service road along Highway 40.

The discharge from the east spillway, as originally developed, runs into a deep, natural ravine about 250 feet north of the east end of the dam. The discharge from the northwest branch of the east spillway which is the eroded alignment that has developed, has cut a ditch in virgin soil that is well clear of the toe of dam. Both these flows run westwardly along the toe of the south service road embankment to a 24-inch diameter pipe culvert under the embankment. See final sentences of paragraphs 1.2.h and 3.1.c.

Flow over the west spillway which apparently has been infrequent, is overland off the University property into a ditch on the State Highway 94

right-of-way and then, along Highway 94 and the south service road to this same 24-inch pipe culvert. Discharge from this culvert, in turn, is into a narrow triangular area bounded on the other two sides by Highway 94 and the eastbound Highway 40 "ON" ramp. Drainage also comes into this pocket from the west through a 36-inch diameter culvert under Highway 94 and joins drainage from the 24-inch pipe culvert in a larger 48-inch diameter pipe culvert under the eastbound "ON" ramp and the divided lanes of Route 40TR. It then is carried under the westbound "OFF" ramp in a 5-foot by 3-foot box and farther downstream crosses Highway 94 and flows through the Village of Weldon Spring. Flows in excess of the capacity of the 5-foot by 3-foot box and a secondary 30-inch pipe under the westbound "ON" ramp will be ponded under the overpass for the interchange to a potential depth of 10 to 12 feet on the through lanes of Highway 40. It appears that spillway discharges were not included when capacities of these highway structures were designed.

3.2 EVALUATION

None of the conditions observed is significant enough to indicate a need for immediate remedial action or a serious potential failure. Trees provide shelter and habitat for rodents whose burrowing activity might cause detrimental seepage. Furthermore, as the trees mature and die, seepage through the embankment may occur as the roots decay. The tree growth on the east third of the dam should be removed then turf established. Continued annual attention to cutting growth on the slopes of the dam is suggested.

A definite location of the possible 2-inch valve and pipe through the dam which was not located by visual inspection should be established. A pipe through the dam could corrode and leak allowing soil to migrate from within the dam embankment. Its end should be marked so that periodic inspections can be made to verify the soundness of the pipe and valve and the condition of surrounding embankment.

Neither the wave-wash on the upstream slope of the dam nor the reservoir slopes nor the erosion on the valley slope in any way endanger the integrity of the dam at existing water levels. When the reservoir level is at spillway crest elevation, wave-wash could degrade the dam crest and a potential of overtopping could develop.

The inspection team is of the opinion that the appearance of the northwest branch of the east spillway indicates that appreciable discharges from the lake have passed through it at some time, despite the farm manager's statements to the contrary; i.e., that lake levels have never reached spillway elevation. The inspection team has considered the possibility this may be erosion on a cattle path in making this evaluation. If appreciable flows (peak and volume) occur in this branch of the spillway, there is a potential of erosion of the adjoining dam embankment. It is suggested that erosion-resistant lining be provided for this branch of the spillway and the berm between it and the dam.

Appreciable spillway discharges, if such ever occur, could cause flooding of the through lanes of U.S. Route 40TR.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

There are no presently located controlled outlet works (see paragraph 1.3b(1) for this dam; therefore, no regulating procedures exist. The pool is controlled by rainfall, runoff, evaporation, irrigation pumping, seepage into the reservoir sides and bottom, and capacity of the uncontrolled spillway.

4.2 MAINTENANCE OF DAM

Based on the amount of brush and size of trees on the downstream slope at the eastern end of the dam, only a portion of this slope is occasionally mowed.

4.3 MAINTENANCE OF OPERATING FACILITIES

No presently located operating facilities exist at this dam. (See paragraph 1.3b(1).

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

The inspection team is not aware of any existing warning system for this dam.

4.5 EVALUATION

If the uncontrolled vegetation on the eastern downstream slope is allowed to continue, a serious potential of failure may develop.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. Design Data No design data were readily available.

b. Experience Data The drainage area is developed from USGS Weldon Spring-Missouri Quadrangle. Also available are 1"=2000' aerial stereo pairs taken 9 April 1977, by Surdex Corp. Lake area is measured on a 1"=200' enlargement of a portion of one of these photographs and shown on Plate 2. The spillway and dam layout are from surveys made during the inspection, supplemented by a Missouri State Highway Department aerial topographic map at 1"=200' scale with two-foot contours.

c. Visual Observations

(1) Spillways and exit channels are in fair condition.

(2) No drawdown facilities are available to evacuate the pool.

(3) The spillways and exit channels are located at the east and west ends of the dam. Channels are cut into virgin soil. Spillway releases will not endanger the integrity of this dam.

d. Overtopping Potential (1) The spillways are too small to pass the minimum required flood of one-half the probable maximum without overtopping. The probable maximum flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. The one-half PMF will overtop the sloping top of dam to a maximum depth of about 1.11 feet, varying to zero over a width of 350 feet. Maximum discharge over the top of the dam will be 500 cubic feet per second. Overtopping will occur for 5 hours and 40 minutes. The existing spillways will pass a 100-year frequency flood without overtopping. According to the recommended guidelines from the Department of the Army, Office of the Chief of Engineers, the 100-year frequency flood is only adequate for a low hazard dam of intermediate size.

(2) At the current pool elevation 11.3 feet below the spillway crest, the lake has capacity to retain a one-day 100-year flood without reaching the spillway crest. Assuming a start at the current pool elevation, overtopping of the dam would begin to occur for a flood equal to 70% of the one-day PMF. Because a drawdown tube is absent, there is no assurance the pool will remain at the current elevation. In the future, it is possible that the reservoir will be full at the beginning of a period of intense rainfall. Therefore, the statements in this paragraph cannot justify the lack of adequate spillways but can be used to evaluate the urgency for necessary corrections.

(3) Failure of the two small upstream water impoundments shown on the USGS Weldon Spring 1968 Quadrangle Sheet would not have a significant impact on the hydrologic or hydraulic analysis.

(4) The effect from rupture of the dam could extend approximately one mile downstream of the dam. There are eight inhabited homes downstream of the dam which could be severely damaged and lives of the inhabitants could be lost should failure of the dam occur. Within the damage zone are the interchange between U.S. Route 40TR and State Highway 94, a portion of State Highway 94 and a village road.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations Visual observations which adversely affect the structural stability of this dam are discussed in Section 3, paragraph 3.1b.

b. Design and Construction Data No design or construction data relating to the structural stability of the dam were found.

c. Operating Records No appurtenant structures requiring operation exist at this dam, with the possible exception of the 2-inch steel pipe through the dam, the location of which is unknown. Corrosion and leakage of this pipe could initiate loss of soil (piping) through the dam embankment.

d. Post Construction Changes No post construction changes exist which will affect the structural stability of the dam.

e. Seismic Stability Considering the seismic zone (2) in which this dam is located, an earthquake of this magnitude is not expected to cause a structural failure of this dam.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety The dam will be overtopped by the one-half PMF. Several items were noted during the visual inspection by the inspection team which should be corrected or controlled. The purported 2-inch pipe through the dam should be located. Uncontrolled vegetation growing on the downstream face of the dam should be controlled. Wave-wash will be a serious problem whenever the reservoir level reaches spillway crest elevation. Spillway flows in the northwest branch of the east spillway could potentially threaten erosion of the adjacent dam embankment.

b. Adequacy of Information Due to lack of engineering design and construction data, the conclusions in this report were based on performance history and external visual conditions. The inspection team considers these data sufficient to support the conclusions herein.

c. Urgency The remedial measures recommended in paragraph 7.2 should be accomplished in the near future. If the safety deficiencies listed in paragraph a are not corrected in the near future, they will continue to deteriorate and lead to a serious potential of failure.

d. Necessity for Phase II Based on the results of the Phase I inspection, no Phase II inspection is recommended.

e. Seismic Stability This dam is located in Seismic Zone 2. An earthquake of this magnitude is not expected to be hazardous to this dam.

7.2 REMEDIAL MEASURES

a. Alternatives The owner should obtain the services of an experienced engineer to design and observe construction of remedial measures to prevent overtopping of the dam by the one-half PMF. The spillway size could be increased or an uncontrolled drawdown tube could be installed through the dam to assure that reservoir levels are maintained at no more than slightly higher than current levels. Increasing spillway size would require provision of erosion protection on the upstream slope of the dam and at the northeast branch of the east spillway and would also require consideration of the effect of spillway discharges on the Highway 40-94 interchange drainage system. The possible 2-inch pipe through the dam would not be satisfactory for use as a drawdown tube.

b. Stability and Seepage Analyses The owner should have an engineer experienced in the design and construction of dams prepare seepage and stability analyses.

c. O&M Maintenance and Procedures The following O&M maintenance and procedures are recommended:

(1) Remove uncontrolled vegetation growth on the downstream slope of the dam.

(2) The purported 2-inch steel pipe through the dam should be located and inspected for corrosion and/or leakage. It is probable that a qualified technician using a metal detector could find the pipe and valve if the soil cover over it is three feet or less.

(3) The owner should have an engineer experienced in the design and construction of dams make periodic inspections of this project.

(4) The owner should keep a record of all future repairs, maintenance and inspections.

APPENDIX A

HYDROLOGIC COMPUTATIONS

HYDROLOGIC AND HYDRAULIC ANALYSIS METHODOLOGY

1. The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for a reservoir routing. The Probable Maximum Precipitation for those dams in the high hazard potential category is derived and determined from regional charts prepared by the National Weather Service in "Hydrometeorological Report No. 33". Reduction factors have not been applied. A 24-hour storm duration is assumed with the 24-hour rainfall depths distributed over 6-hour periods in accordance with procedures outlined in EM 1110-2-1411 (SPF Determination). The maximum 6-hour rainfall period is then distributed to hourly increments by the same criteria. Within-the-hour distribution is based upon NOAA Technical Memorandum NWS HYDRO-35. The non-peak 6-hour rainfall periods are distributed uniformly. All distributed values are arranged in a critical sequence by the SPF criteria. The final inflow hydrograph is produced by deduction of infiltration losses appropriate to the soil, land use and antecedent moisture conditions.

2. The reservoir routing is accomplished by using Modified Puls routing techniques wherein the flood hydrograph is routed through lake storage. Hydraulic capacities of the outlet works, spillway, and crest of dam are used as outlet controls in the routing. Storage in the pool area is defined by an elevation-area curve. The hydraulic capacity of the spillways is defined by an elevation-discharge curve. The hydraulic capacity of the sloping top of dam is defined by a triangular broad-crested weir equation.

3. Dam overtopping analysis has been conducted by hydrologic methods for this dam and lake. This computation determines the percentage of the PMF hydrograph that the reservoir can contain without the dam being overtopped. An output summary in the hydrologic appendix displays this information as well as other characteristics of the simulated dam overtopping.

4. The above methodology has been accomplished for this report using the systemized computer program HEC-1 (Dam Safety Version), July 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. The numeric parameters estimated for this site are listed on Plate 1A. Definitions of these variables are contained in the "User's Manual" for the computer program.

5. The discharge in the spillways was calculated using critical depth at the control section near where the dam centerline crosses the spillway channels, allowing 0.2 velocity head for non-uniform velocity distribution, velocity transition losses and friction in the short approach channel. This is equivalent to calculating the spillway as a broad-crested weir with a discharge coefficient of 2.80.

6. The average longitudinal slope of top of dam was determined by plotting length of crest subject to overflow for incremental increases in lake elevation above the lowest crest elevation. The "Z" value thus obtained (increase in lineal feet of crest subject to overflow per foot of rise in the lake) was then used in the triangular broad-crested weir equation: Q = C*0.4*Z*H**2.5.

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  3 AUG 78
**********
    1              A  ********** ID # 10643 NONAME # 207 - MISSOURI UNIV. EXP. FARM******
    2              A  ********** DAM SAFETY PROGRAM - U. S. CORPS OF ENGINEERS **********
    3              A  ********** REITZ & JENS, INC. -    AUGUST 1978 **********
    4              B    288       0       5      -0      -0      -0      -0      -0      -4      -0
    5              1      5
    6              J      1       9       1
    7              J1  0.15    0.20    0.25    0.30    0.40    0.50    0.60    0.70    1.00
    8              K      0       1                       1       3       1
    9              1  ***** INFLOW HYDROGRAPH - SCS METHOD *****
   10              M      1       2   0.469                           1                       1
   11              P             24.8     101     120     130
   12              T                                                      -1      -86             0.15
   13              W2            0.35
   14              X            -0.10     2.0
   15              K      1      04                       1               1
   16              1  ***** RESERVOIR ROUTING - RATING CURVE SUPPLIED - SLOPING DAM *****
   17              Y                                       1       1
   18              Y1     1                                                -577.3      -1
   19              Y4 577.3  577.56   577.8   578.0  578.24   578.5   579.0   579.5   580.0   580.5
   20              Y4 581.0   581.5   582.0
   21              Y5   0.0     1.4       4       8    27.6      52     139     303     539     865
   22              Y5  1305    1815    2460
   23              $A  0.00   25.73    32.0    57.9    88.2
   24              $E   541     566     570     580     590
   25              $$ 577.3
   26              $D 579.2     3.0     2.5   130.0
   27              K     99
```

PLATE A-1
Sheet 1 of 5

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**********************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  3 AUG 78
**********************************

RUN  DATE0 09/21/78.
     TIME0 14.13.52.

     * ********** ID # 10643 NONAME # 207 - MISSOURI UNIV. EXP. FARM******
      ********** DAM SAFETY PROGRAM - U. S. CORPS OF ENGINEERS **********
      ********** REITZ & JENS, INC. -    AUGUST 1978 **********************

                                JOB SPECIFICATION
       NO      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
      288        0        5       -0       -0       -0       -0       -0       -4       -0
                             JOPER      NWT   LROPT   TRACE
                                 5       -0      -0      -0

                          MULTI-PLAN ANALYSES TO BE PERFORMED
                              NPLAN= 1 NRTIO= 9 LRTIO= 1
          RTIOS=    .15    .20    .25    .30    .40    .50    .60    .70   1.00

**********          **********          **********          **********          **********

                              SUB-AREA RUNOFF COMPUTATION

          ***** INFLOW HYDROGRAPH - SCS METHOD *****
                        ISTAQ   ICOMP   IECON   ITAPE    JPLT    JPRT   INAME  ISTAGE   IAUTO
                            1       0      -0      -0       1       3       1      -0      -0

                                HYDROGRAPH DATA
           IHYDG    IUHG   TAREA    SNAP   TRSDA   TRSPC   RATIO   ISNOW   ISAME   LOCAL
               1       2     .47   -0.00     .47    1.00  -0.000      -0       1      -0

                                  PRECIP DATA
                    SPFE     PMS      R6     R12     R24     R48     R72     R96
                   -0.00   24.80  101.00  120.00  130.00   -0.00   -0.00   -0.00

                                   LOSS DATA
        LROPT   STRKR   DLTKR   RTIOL   ERAIN   STRKS   RTIOK   STRTL   CNSTL   ALSMX   RTIMP
           -0   -0.00   -0.00    1.00   -0.00   -0.00    1.00   -1.00  -86.00   -0.00     .15

          CURVE NO =  -86.00  WETNESS =   -1.00  EFFECT CN =   86.00

                              UNIT HYDROGRAPH DATA
                           TC= -0.00    LAG=   .35

                                RECESSION DATA
                        STRTQ=   -0.00    QRCSN=    -.10    RTIOR= 2.00

          UNIT HYDROGRAPH 23 END OF PERIOD ORDINATES, TC=   -0.00 HOURS, LAG=    .35  VOL= 1.00
        65.      203.      417.      556.      575.      507.      400.      265.      187.      135.
        95.       67.       48.       33.       24.       17.       12.        8.        6.        5.
         3.        2.        1.

     0                          END-OF-PERIOD FLOW
    MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q       MO.DA  HR.MN  PERIOD   RAIN   EXCS   LOSS    COMP Q
```

PLATE A-1
Sheet 2 of 5

0 MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	END-OF-PERIOD FLOW MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
1.01	.05	1	.01	.00	.01	0.	1.01	12.05	145	.21	.20	.01	234.
1.01	.10	2	.01	.00	.01	1.	1.01	12.10	146	.21	.20	.01	263.
1.01	.15	3	.01	.00	.01	1.	1.01	12.15	147	.21	.20	.01	320.
1.01	.20	4	.01	.00	.01	3.	1.01	12.20	148	.21	.20	.01	397.
1.01	.25	5	.01	.00	.01	4.	1.01	12.25	149	.21	.20	.01	476.
1.01	.30	6	.01	.00	.01	5.	1.01	12.30	150	.21	.20	.01	547.
1.01	.35	7	.01	.00	.01	6.	1.01	12.35	151	.21	.20	.01	603.
1.01	.40	8	.01	.00	.01	6.	1.01	12.40	152	.21	.20	.01	640.
1.01	.45	9	.01	.00	.01	7.	1.01	12.45	153	.21	.20	.01	667.
1.01	.50	10	.01	.00	.01	7.	1.01	12.50	154	.21	.20	.01	687.
1.01	.55	11	.01	.00	.01	7.	1.01	12.55	155	.21	.20	.01	701.
1.01	1.00	12	.01	.00	.01	7.	1.01	13.00	156	.21	.20	.01	711.
1.01	1.05	13	.01	.00	.01	7.	1.01	13.05	157	.25	.24	.01	722.
1.01	1.10	14	.01	.00	.01	7.	1.01	13.10	158	.25	.24	.01	736.
1.01	1.15	15	.01	.00	.01	7.	1.01	13.15	159	.25	.24	.01	757.
1.01	1.20	16	.01	.00	.01	7.	1.01	13.20	160	.25	.25	.01	783.
1.01	1.25	17	.01	.00	.01	7.	1.01	13.25	161	.25	.25	.00	809.
1.01	1.30	18	.01	.00	.01	7.	1.01	13.30	162	.25	.25	.00	832.
1.01	1.35	19	.01	.00	.01	7.	1.01	13.35	163	.25	.25	.00	850.
1.01	1.40	20	.01	.00	.01	7.	1.01	13.40	164	.25	.25	.00	862.
1.01	1.45	21	.01	.00	.01	7.	1.01	13.45	165	.25	.25	.00	871.
1.01	1.50	22	.01	.00	.01	8.	1.01	13.50	166	.25	.25	.00	878.
1.01	1.55	23	.01	.00	.01	8.	1.01	13.55	167	.25	.25	.00	883.
1.01	2.00	24	.01	.00	.01	8.	1.01	14.00	168	.25	.25	.00	886.
1.01	2.05	25	.01	.00	.01	8.	1.01	14.05	169	.31	.31	.00	893.
1.01	2.10	26	.01	.00	.01	8.	1.01	14.10	170	.31	.31	.00	907.
1.01	2.15	27	.01	.00	.01	8.	1.01	14.15	171	.31	.31	.00	935.
1.01	2.20	28	.01	.00	.01	8.	1.01	14.20	172	.31	.31	.00	970.
1.01	2.25	29	.01	.00	.01	8.	1.01	14.25	173	.31	.31	.00	1007.
1.01	2.30	30	.01	.00	.01	9.	1.01	14.30	174	.31	.31	.00	1039.
1.01	2.35	31	.01	.00	.01	9.	1.01	14.35	175	.31	.31	.00	1065.
1.01	2.40	32	.01	.00	.01	10.	1.01	14.40	176	.31	.31	.00	1082.
1.01	2.45	33	.01	.00	.01	10.	1.01	14.45	177	.31	.31	.00	1094.
1.01	2.50	34	.01	.00	.01	11.	1.01	14.50	178	.31	.31	.00	1103.
1.01	2.55	35	.01	.00	.01	11.	1.01	14.55	179	.31	.31	.00	1110.
1.01	3.00	36	.01	.00	.01	12.	1.01	15.00	180	.31	.31	.00	1115.
1.01	3.05	37	.01	.00	.01	13.	1.01	15.05	181	.19	.19	.00	1110.
1.01	3.10	38	.01	.00	.01	13.	1.01	15.10	182	.38	.38	.00	1100.
1.01	3.15	39	.01	.00	.01	14.	1.01	15.15	183	.38	.38	.00	1090.
1.01	3.20	40	.01	.00	.01	14.	1.01	15.20	184	.57	.57	.00	1114.
1.01	3.25	41	.01	.00	.01	15.	1.01	15.25	185	.67	.66	.00	1195.
1.01	3.30	42	.01	.00	.01	15.	1.01	15.30	186	1.62	1.61	.01	1402.
1.01	3.35	43	.01	.01	.01	16.	1.01	15.35	187	2.67	2.65	.01	1854.
1.01	3.40	44	.01	.01	.01	16.	1.01	15.40	188	1.05	1.04	.00	2562.
1.01	3.45	45	.01	.01	.01	17.	1.01	15.45	189	.67	.66	.00	3351.
1.01	3.50	46	.01	.01	.01	17.	1.01	15.50	190	.57	.57	.00	3864.
1.01	3.55	47	.01	.01	.01	18.	1.01	15.55	191	.38	.38	.00	3962.
1.01	4.00	48	.01	.01	.01	18.	1.01	16.00	192	.38	.38	.00	3725.
1.01	4.05	49	.01	.01	.01	19.	1.01	16.05	193	.29	.29	.00	3272.
1.01	4.10	50	.01	.01	.01	19.	1.01	16.10	194	.29	.29	.00	2749.
1.01	4.15	51	.01	.01	.01	20.	1.01	16.15	195	.29	.29	.00	2324.
1.01	4.20	52	.01	.01	.01	20.	1.01	16.20	196	.29	.29	.00	1989.
1.01	4.25	53	.01	.01	.01	21.	1.01	16.25	197	.29	.29	.00	1725.
1.01	4.30	54	.01	.01	.01	21.	1.01	16.30	198	.29	.29	.00	1532.
1.01	4.35	55	.01	.01	.01	21.	1.01	16.35	199	.29	.29	.00	1391.
1.01	4.40	56	.01	.01	.01	22.	1.01	16.40	200	.29	.29	.00	1293.
1.01	4.45	57	.01	.01	.01	22.	1.01	16.45	201	.29	.29	.00	1224.
1.01	4.50	58	.01	.01	.01	22.	1.01	16.50	202	.29	.29	.00	1175.
1.01	4.55	59	.01	.01	.01	23.	1.01	16.55	203	.29	.29	.00	1141.
1.01	5.00	60	.01	.01	.01	23.	1.01	17.00	204	.29	.29	.00	1117.
1.01	5.05	61	.01	.01	.01	24.	1.01	17.05	205	.23	.23	.00	1096.
1.01	5.10	62	.01	.01	.01	24.	1.01	17.10	206	.23	.23	.00	1071.
1.01	5.15	63	.01	.01	.01	24.	1.01	17.15	207	.23	.23	.00	1036.
1.01	5.20	64	.01	.01	.01	25.	1.01	17.20	208	.23	.23	.00	993.

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Sheet 3 of 5

1.01	5.25	65	.01	.01	.01	25.
1.01	5.30	66	.01	.01	.01	25.
1.01	5.35	67	.01	.01	.01	26.
1.01	5.40	68	.01	.01	.01	26.
1.01	5.45	69	.01	.01	.01	26.
1.01	5.50	70	.01	.01	.01	26.
1.01	5.55	71	.01	.01	.01	27.
1.01	6.00	72	.01	.01	.01	27.
1.01	6.05	73	.07	.04	.03	29.
1.01	6.10	74	.07	.04	.03	36.
1.01	6.15	75	.07	.04	.02	49.
1.01	6.20	76	.07	.04	.02	67.
1.01	6.25	77	.07	.04	.02	86.
1.01	6.30	78	.07	.04	.02	104.
1.01	6.35	79	.07	.05	.02	120.
1.01	6.40	80	.07	.05	.02	131.
1.01	6.45	81	.07	.05	.02	140.
1.01	6.50	82	.07	.05	.02	148.
1.01	6.55	83	.07	.05	.02	154.
1.01	7.00	84	.07	.05	.02	160.
1.01	7.05	85	.07	.05	.02	164.
1.01	7.10	86	.07	.05	.01	168.
1.01	7.15	87	.07	.05	.01	172.
1.01	7.20	88	.07	.05	.01	175.
1.01	7.25	89	.07	.05	.01	178.
1.01	7.30	90	.07	.05	.01	181.
1.01	7.35	91	.07	.05	.01	183.
1.01	7.40	92	.07	.05	.01	186.
1.01	7.45	93	.07	.05	.01	188.
1.01	7.50	94	.07	.05	.01	190.
1.01	7.55	95	.07	.06	.01	192.
1.01	8.00	96	.07	.06	.01	193.
1.01	8.05	97	.07	.06	.01	195.
1.01	8.10	98	.07	.06	.01	197.
1.01	8.15	99	.07	.06	.01	198.
1.01	8.20	100	.07	.06	.01	199.
1.01	8.25	101	.07	.06	.01	201.
1.01	8.30	102	.07	.06	.01	202.
1.01	8.35	103	.07	.06	.01	203.
1.01	8.40	104	.07	.06	.01	204.
1.01	8.45	105	.07	.06	.01	205.
1.01	8.50	106	.07	.06	.01	206.
1.01	8.55	107	.07	.06	.01	207.
1.01	9.00	108	.07	.06	.01	208.
1.01	9.05	109	.07	.06	.01	209.
1.01	9.10	110	.07	.06	.01	210.
1.01	9.15	111	.07	.06	.01	211.
1.01	9.20	112	.07	.06	.01	212.
1.01	9.25	113	.07	.06	.01	212.
1.01	9.30	114	.07	.06	.01	213.
1.01	9.35	115	.07	.06	.01	214.
1.01	9.40	116	.07	.06	.01	214.
1.01	9.45	117	.07	.06	.01	215.
1.01	9.50	118	.07	.06	.01	216.
1.01	9.55	119	.07	.06	.01	216.
1.01	10.00	120	.07	.06	.01	217.
1.01	10.05	121	.07	.06	.00	217.
1.01	10.10	122	.07	.06	.00	218.
1.01	10.15	123	.07	.06	.00	218.
1.01	10.20	124	.07	.06	.00	219.
1.01	10.25	125	.07	.06	.00	219.
1.01	10.30	126	.07	.06	.00	220.
1.01	17.25	209	.23	.23	.00	951.
1.01	17.30	210	.23	.23	.00	916.
1.01	17.35	211	.23	.23	.00	889.
1.01	17.40	212	.23	.23	.00	872.
1.01	17.45	213	.23	.23	.00	860.
1.01	17.50	214	.23	.23	.00	851.
1.01	17.55	215	.23	.23	.00	845.
1.01	18.00	216	.23	.23	.00	841.
1.01	18.05	217	.02	.02	.00	825.
1.01	18.10	218	.02	.02	.00	781.
1.01	18.15	219	.02	.02	.00	692.
1.01	18.20	220	.02	.02	.00	575.
1.01	18.25	221	.02	.02	.00	455.
1.01	18.30	222	.02	.02	.00	384.
1.01	18.35	223	.02	.02	.00	358.
1.01	18.40	224	.02	.02	.00	334.
1.01	18.45	225	.02	.02	.00	312.
1.01	18.50	226	.02	.02	.00	291.
1.01	18.55	227	.02	.02	.00	272.
1.01	19.00	228	.02	.02	.00	253.
1.01	19.05	229	.02	.02	.00	237.
1.01	19.10	230	.02	.02	.00	221.
1.01	19.15	231	.02	.02	.00	206.
1.01	19.20	232	.02	.02	.00	192.
1.01	19.25	233	.02	.02	.00	179.
1.01	19.30	234	.02	.02	.00	167.
1.01	19.35	235	.02	.02	.00	156.
1.01	19.40	236	.02	.02	.00	146.
1.01	19.45	237	.02	.02	.00	136.
1.01	19.50	238	.02	.02	.00	127.
1.01	19.55	239	.02	.02	.00	118.
1.01	20.00	240	.02	.02	.00	110.
1.01	20.05	241	.02	.02	.00	103.
1.01	20.10	242	.02	.02	.00	96.
1.01	20.15	243	.02	.02	.00	90.
1.01	20.20	244	.02	.02	.00	84.
1.01	20.25	245	.02	.02	.00	78.
1.01	20.30	246	.02	.02	.00	75.
1.01	20.35	247	.02	.02	.00	75.
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1.01	20.50	250	.02	.02	.00	75.
1.01	20.55	251	.02	.02	.00	75.
1.01	21.00	252	.02	.02	.00	75.
1.01	21.05	253	.02	.02	.00	75.
1.01	21.10	254	.02	.02	.00	75.
1.01	21.15	255	.02	.02	.00	75.
1.01	21.20	256	.02	.02	.00	75.
1.01	21.25	257	.02	.02	.00	75.
1.01	21.30	258	.02	.02	.00	75.
1.01	21.35	259	.02	.02	.00	75.
1.01	21.40	260	.02	.02	.00	75.
1.01	21.45	261	.02	.02	.00	75.
1.01	21.50	262	.02	.02	.00	75.
1.01	21.55	263	.02	.02	.00	75.
1.01	22.00	264	.02	.02	.00	75.
1.01	22.05	265	.02	.02	.00	75.
1.01	22.10	266	.02	.02	.00	75.
1.01	22.15	267	.02	.02	.00	75.
1.01	22.20	268	.02	.02	.00	75.
1.01	22.25	269	.02	.02	.00	75.
1.01	22.30	270	.02	.02	.00	75.

PLATE A-1
Sheet 4 of 5

1.01	10.25	125	.07	.06	.00	219.	1.01	22.25	269	.02	.02	.00	75.
1.01	10.30	126	.07	.06	.00	220.	1.01	22.30	270	.02	.02	.00	75.
1.01	10.35	127	.07	.06	.00	220.	1.01	22.35	271	.02	.02	.00	75.
1.01	10.40	128	.07	.06	.00	220.	1.01	22.40	272	.02	.02	.00	75.
1.01	10.45	129	.07	.06	.00	221.	1.01	22.45	273	.02	.02	.00	75.
1.01	10.50	130	.07	.06	.00	221.	1.01	22.50	274	.02	.02	.00	75.
1.01	10.55	131	.07	.06	.00	222.	1.01	22.55	275	.02	.02	.00	75.
1.01	11.00	132	.07	.06	.00	222.	1.01	23.00	276	.02	.02	.00	75.
1.01	11.05	133	.07	.06	.00	222.	1.01	23.05	277	.02	.02	.00	75.
1.01	11.10	134	.07	.06	.00	223.	1.01	23.10	278	.02	.02	.00	75.
1.01	11.15	135	.07	.06	.00	223.	1.01	23.15	279	.02	.02	.00	75.
1.01	11.20	136	.07	.06	.00	223.	1.01	23.20	280	.02	.02	.00	75.
1.01	11.25	137	.07	.06	.00	224.	1.01	23.25	281	.02	.02	.00	75.
1.01	11.30	138	.07	.06	.00	224.	1.01	23.30	282	.02	.02	.00	75.
1.01	11.35	139	.07	.06	.00	224.	1.01	23.35	283	.02	.02	.00	75.
1.01	11.40	140	.07	.06	.00	224.	1.01	23.40	284	.02	.02	.00	75.
1.01	11.45	141	.07	.06	.00	225.	1.01	23.45	285	.02	.02	.00	75.
1.01	11.50	142	.07	.06	.00	225.	1.01	23.50	286	.02	.02	.00	75.
1.01	11.55	143	.07	.06	.00	225.	1.01	23.55	287	.02	.02	.00	75.
1.01	12.00	144	.07	.06	.00	225.	1.02	0.00	288	.02	.02	.00	75.
									SUM	32.24	30.65	1.59	112819.
										(819.)	(778.)	(40.)	(3194.68)

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL VOLUME
CFS	3962.	1230.	392.	392.	112777.
CMS	112.	35.	11.	11.	3193.
INCHES		24.40	31.07	31.07	31.07
MM		619.71	789.11	789.11	789.11
AC-FT		610.	777.	777.	777.
THOUS CU M		752.	958.	958.	958.

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	577.30	577.30	579.20
STORAGE	627.	627.	727.
OUTFLOW	0.	0.	205.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.15	578.88	0.00	710.	118.	0.00	18.17	0.00
.20	579.20	0.00	727.	203.	0.00	17.25	0.00
.25	579.47	.27	743.	310.	3.08	16.75	0.00
.30	579.71	.51	756.	473.	3.67	16.50	0.00
.40	580.07	.87	777.	858.	4.75	16.33	0.00
.50	580.32	1.12	792.	1271.	5.67	16.17	0.00
.60	580.52	1.32	803.	1671.	6.50	16.17	0.00
.70	580.68	1.48	813.	2061.	7.00	16.17	0.00
1.00	581.06	1.86	836.	3199.	8.33	16.08	0.00

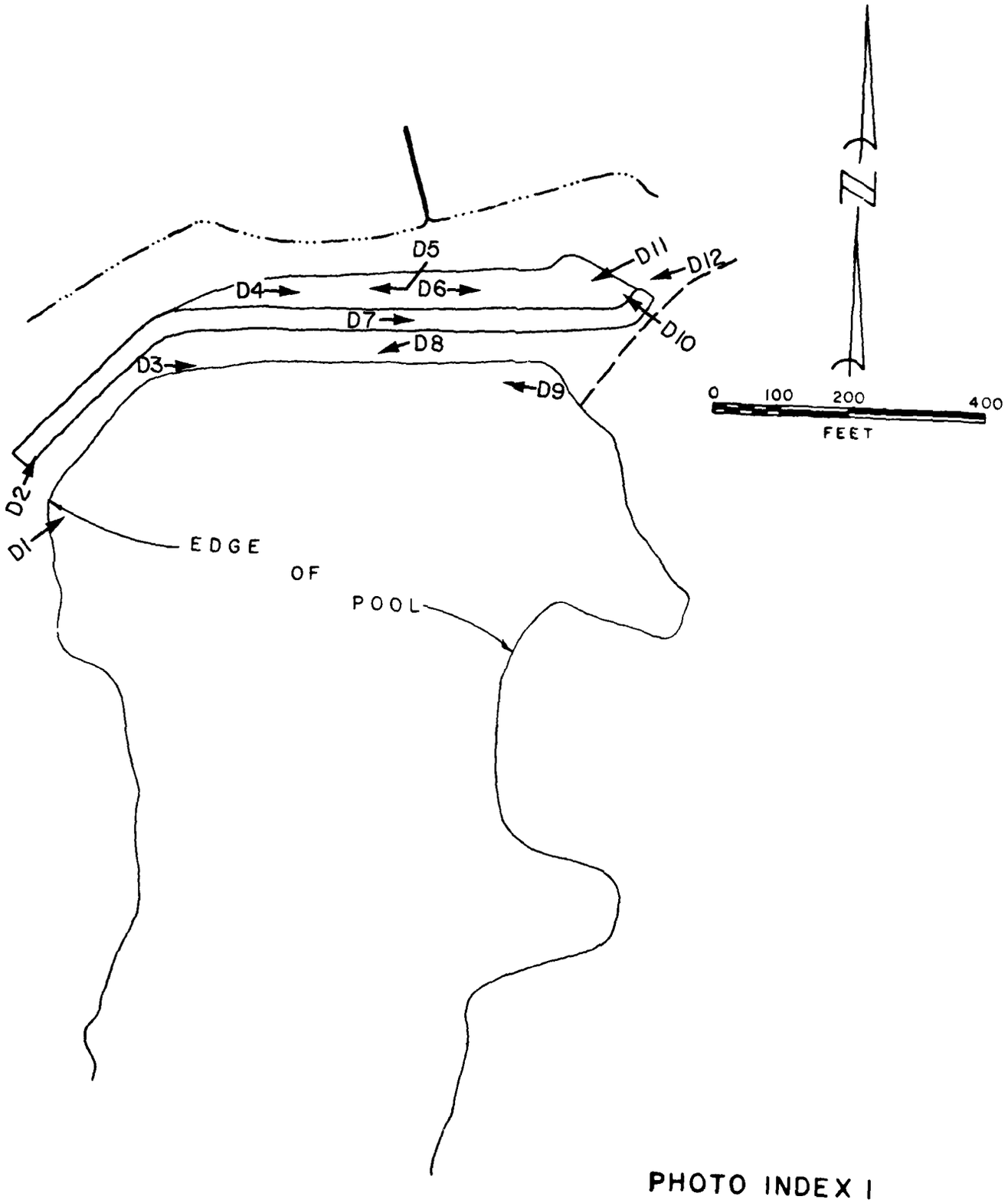
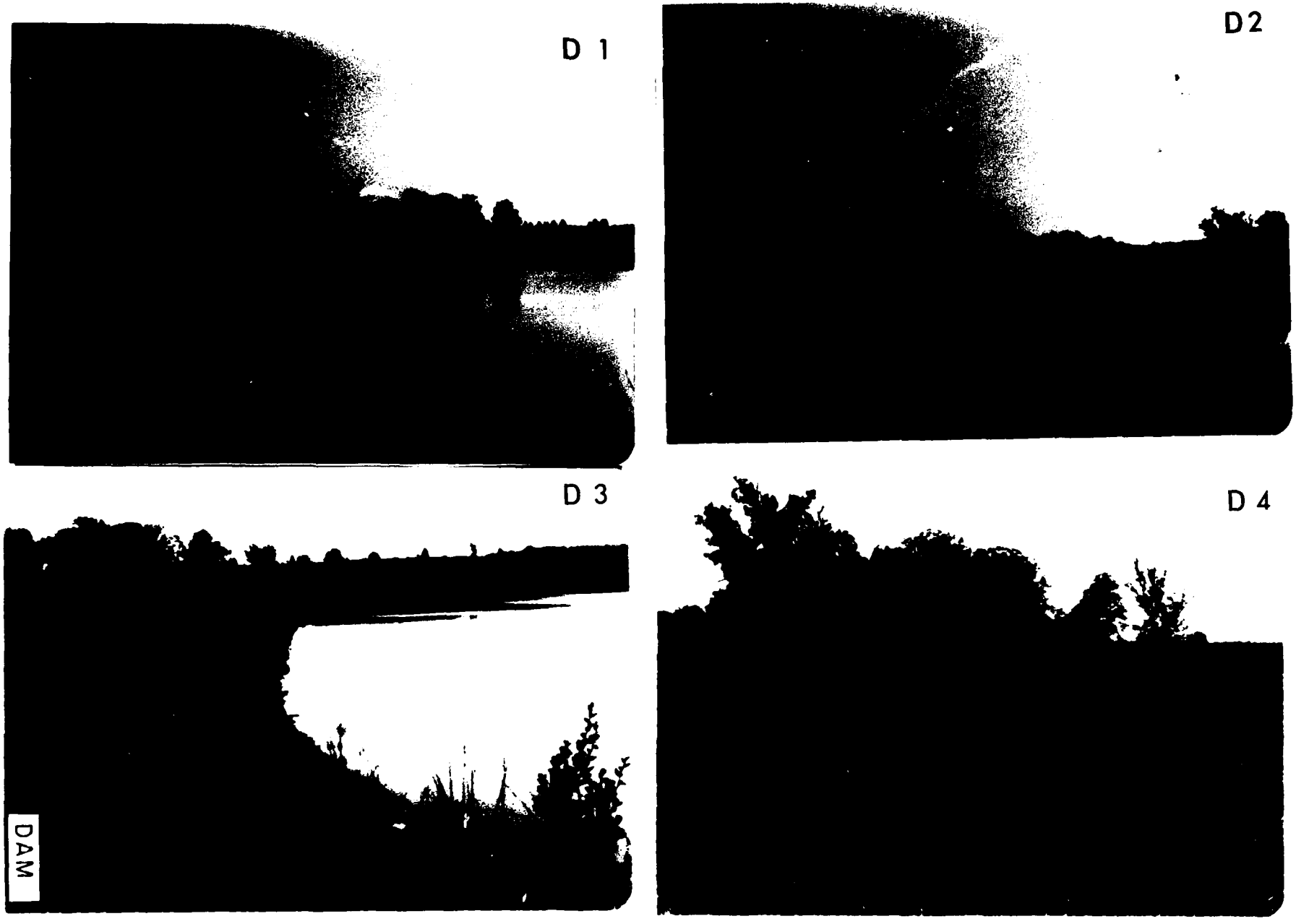


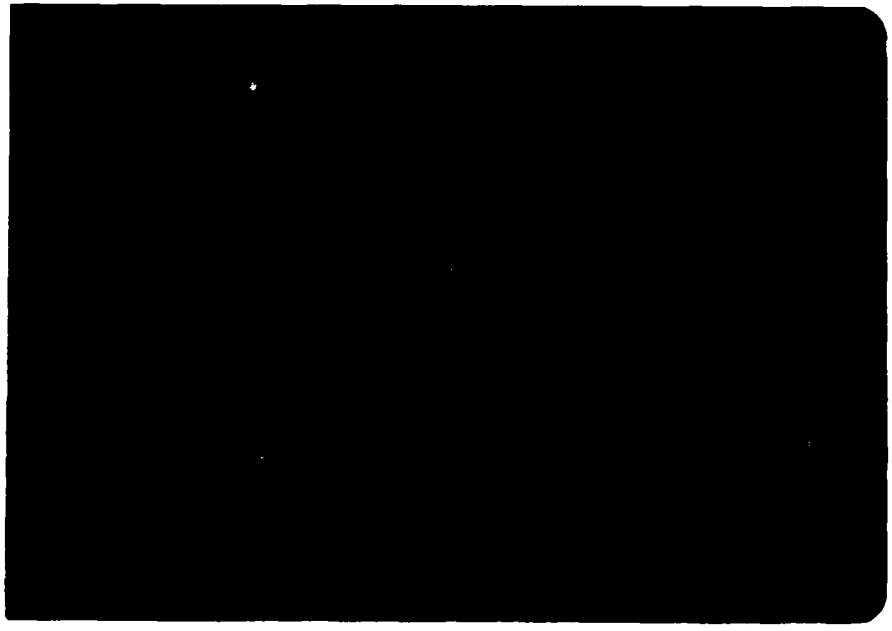
PHOTO INDEX I
FOR
DAM

NO NAME - 207
ST. CHARLES COUNTY, MO.
SEPTEMBER 1978

PREPARED BY
REITZ & JENS, INC


D 1
D2
D 3
D 4
DAM

D 7



D12

DAM

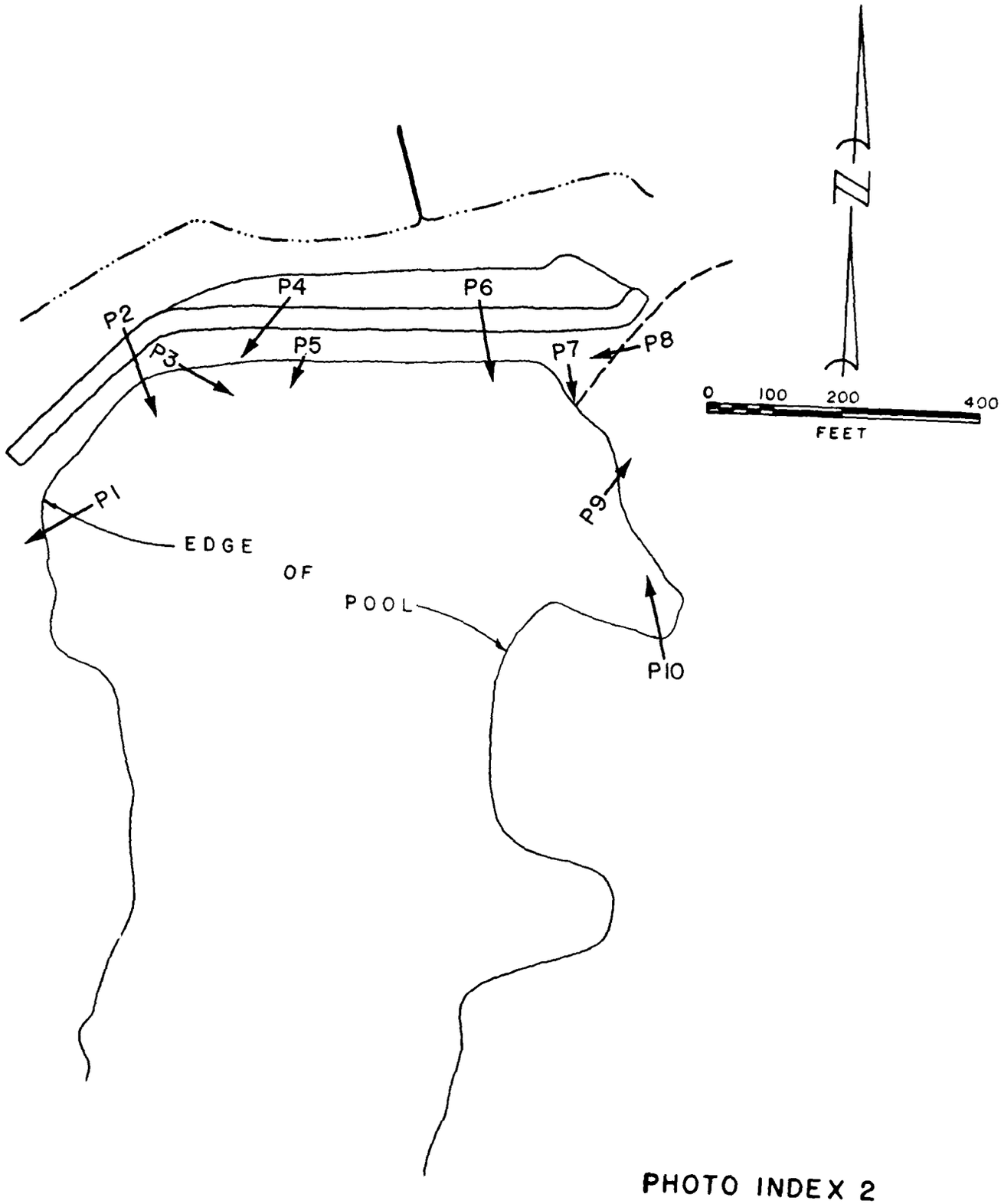
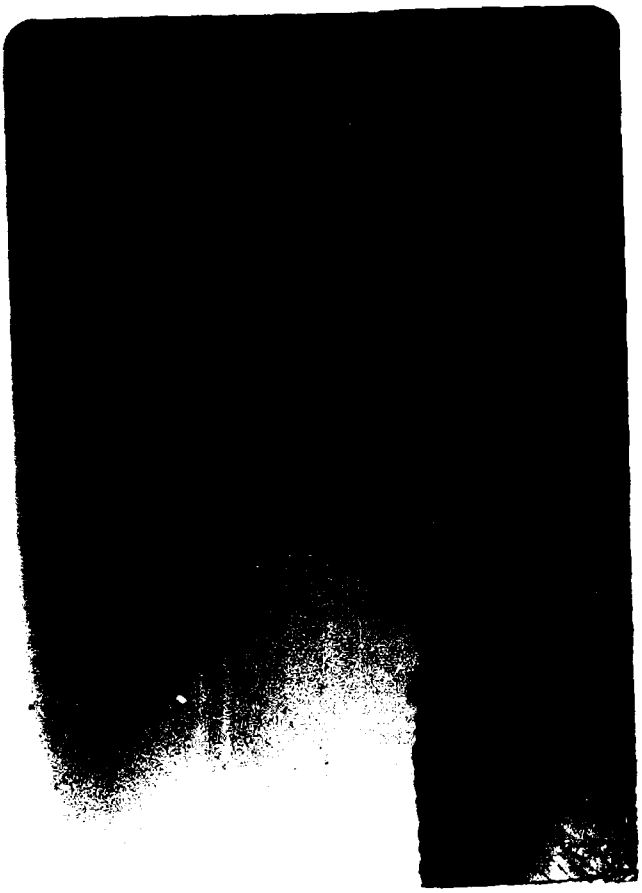
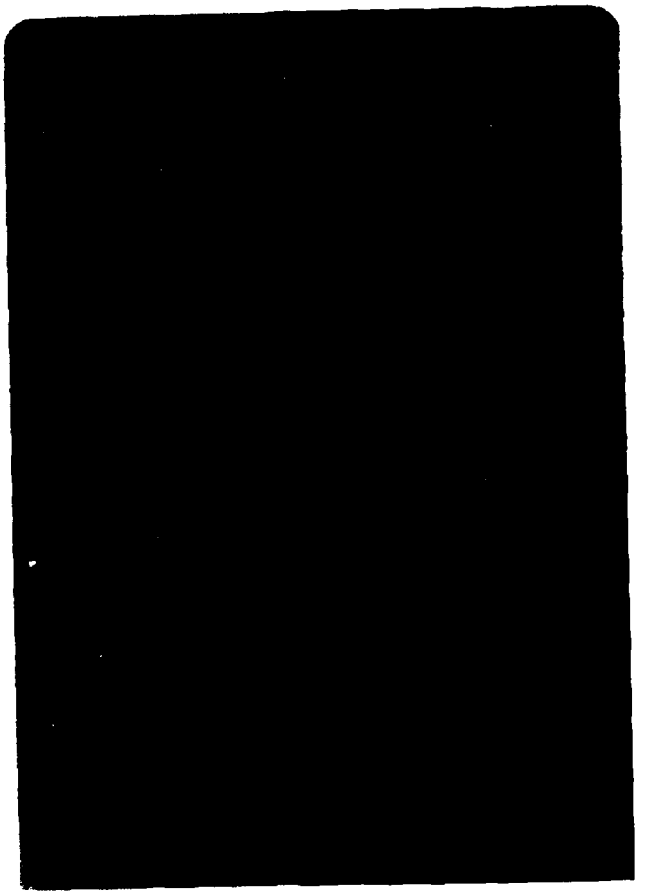


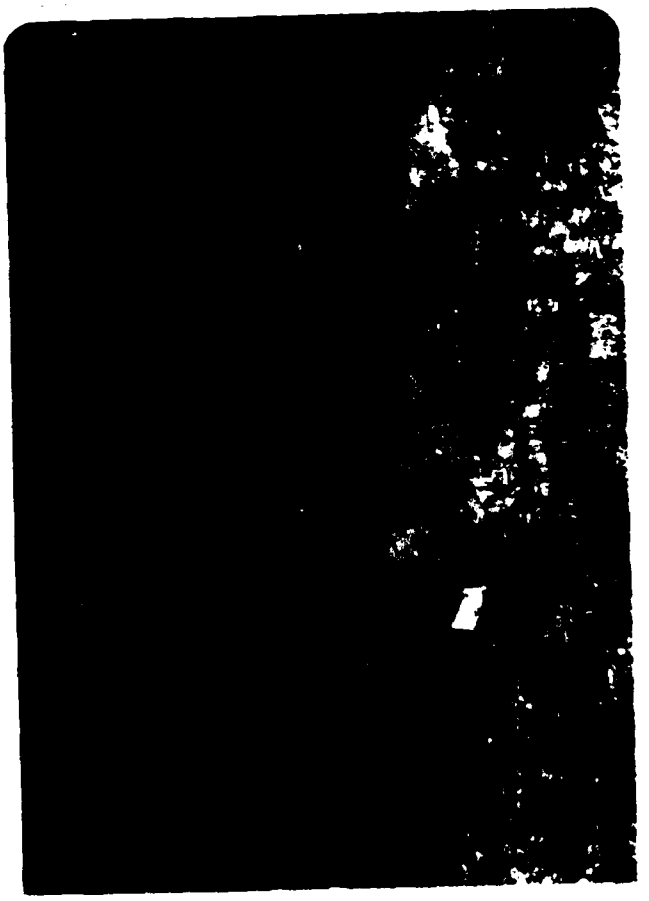
PHOTO INDEX 2
FOR
PANORAMA

NO NAME - 207
ST. CHARLES COUNTY, MO.
SEPTEMBER 1978

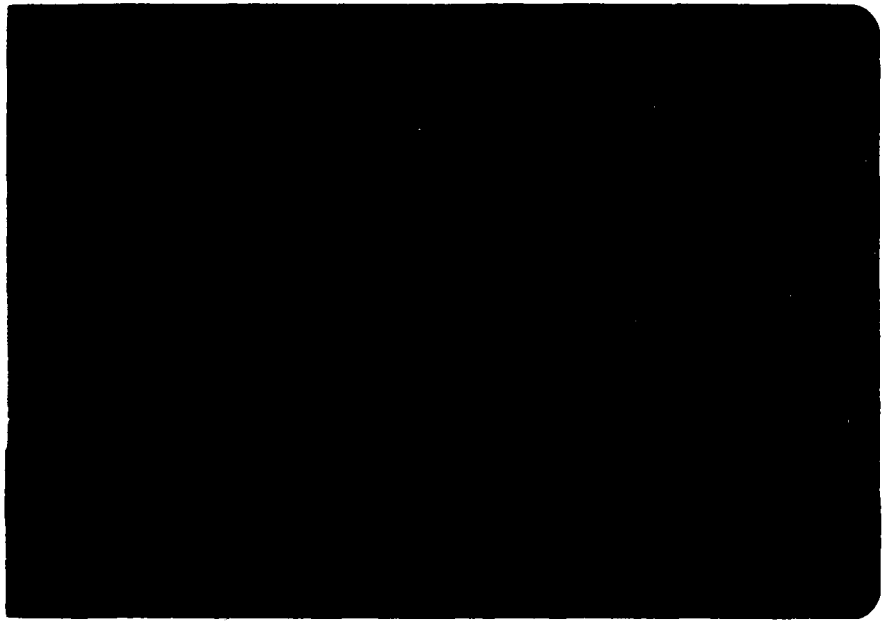
PREPARED BY
REITZ & JENS, INC

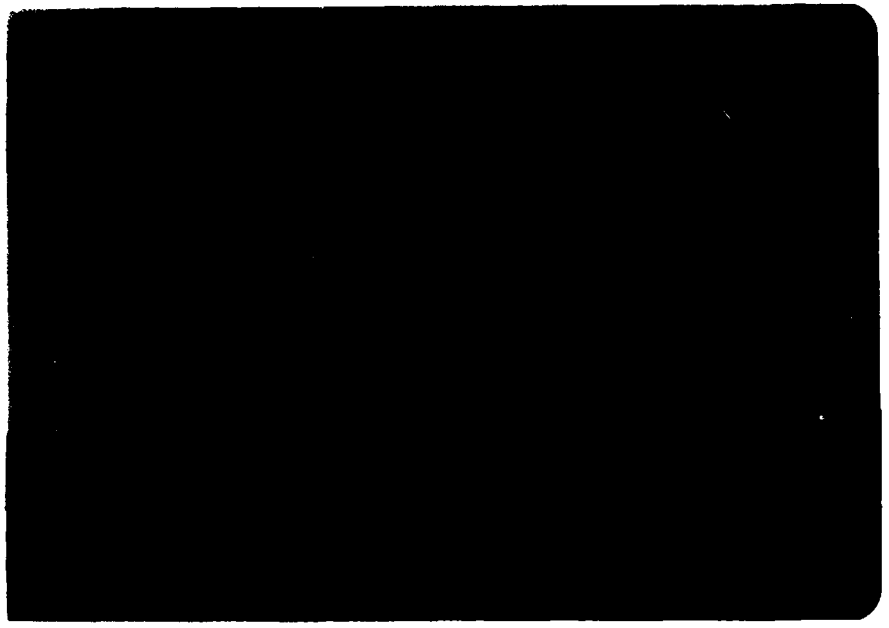







PANORAMA





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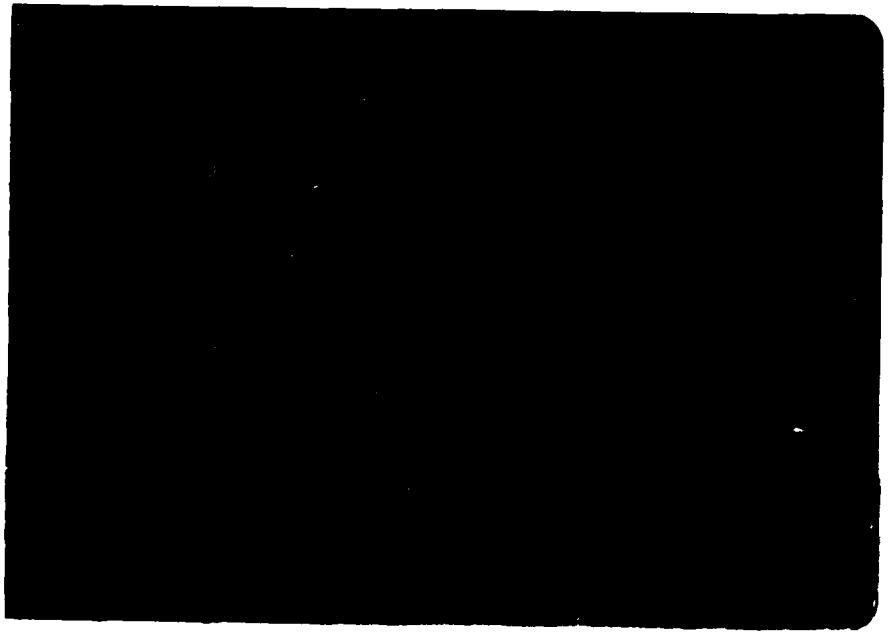


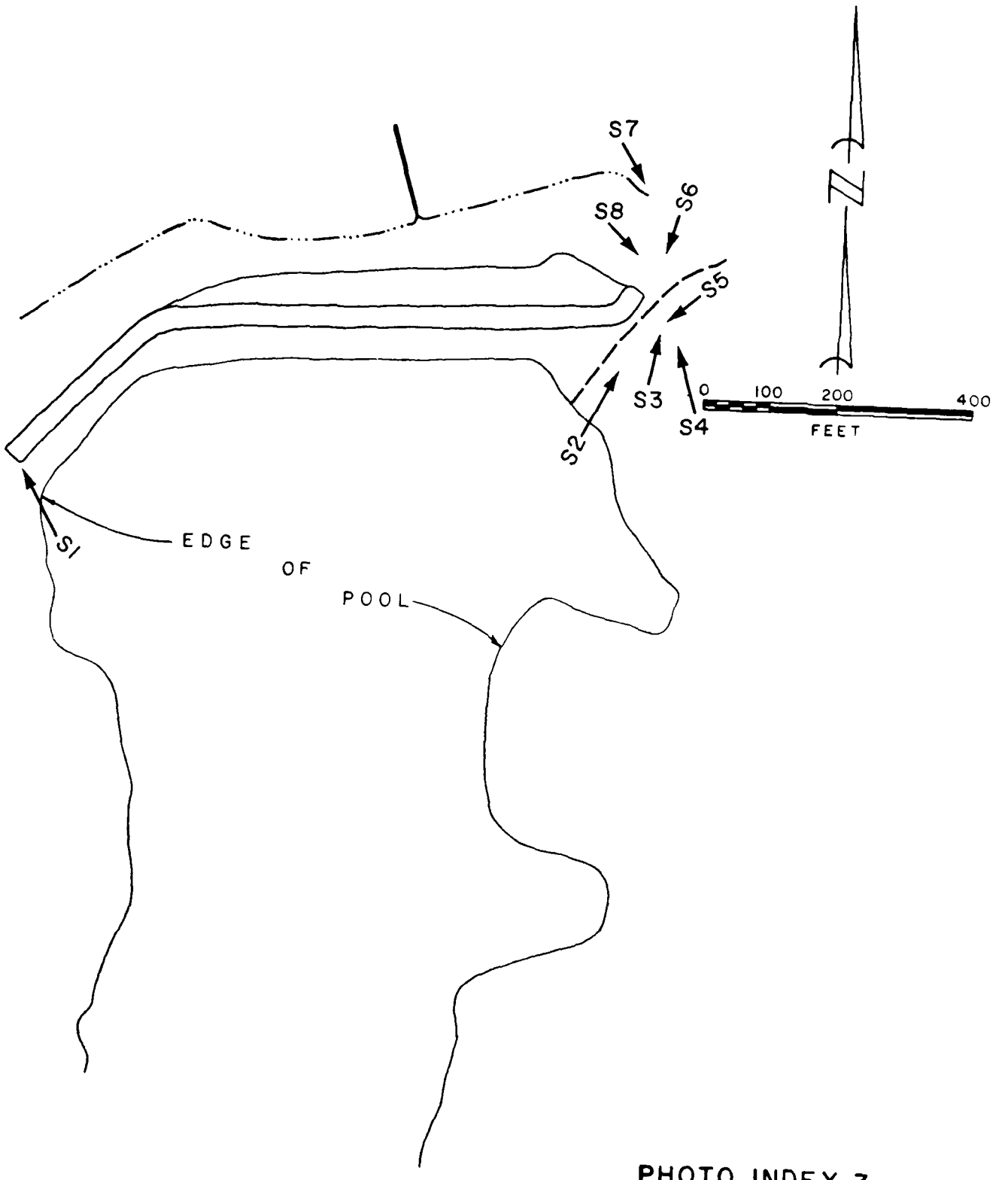
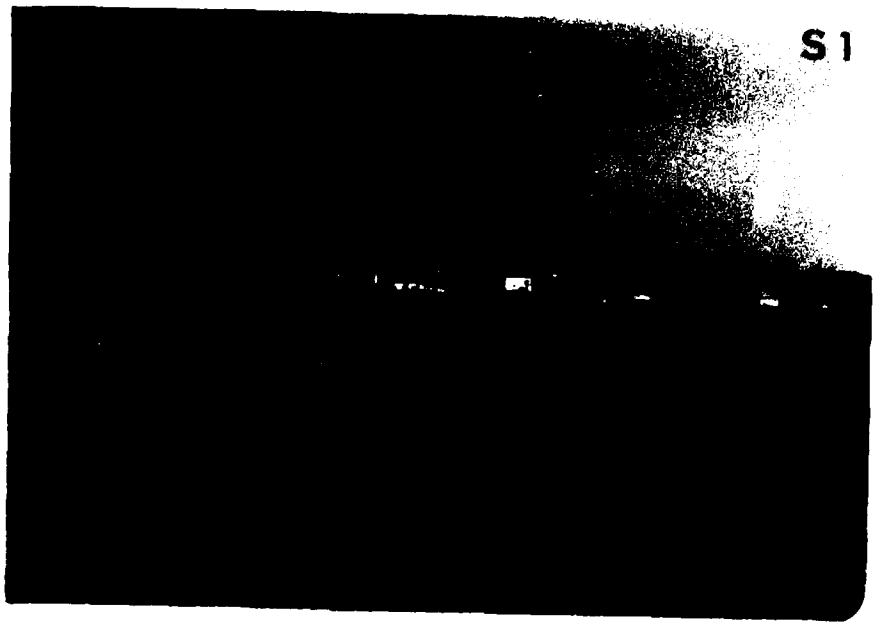


PHOTO INDEX 3
FOR
SPILLWAYS

NO NAME - 207
ST CHARLES COUNTY, MO.
SEPTEMBER 1978

PREPARED BY
REITZ & JENS, INC


S1

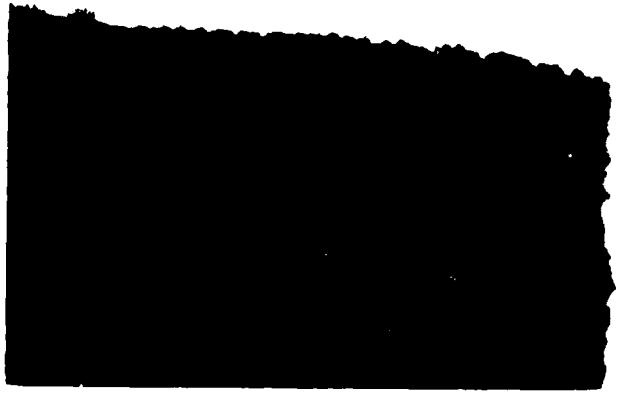

S2

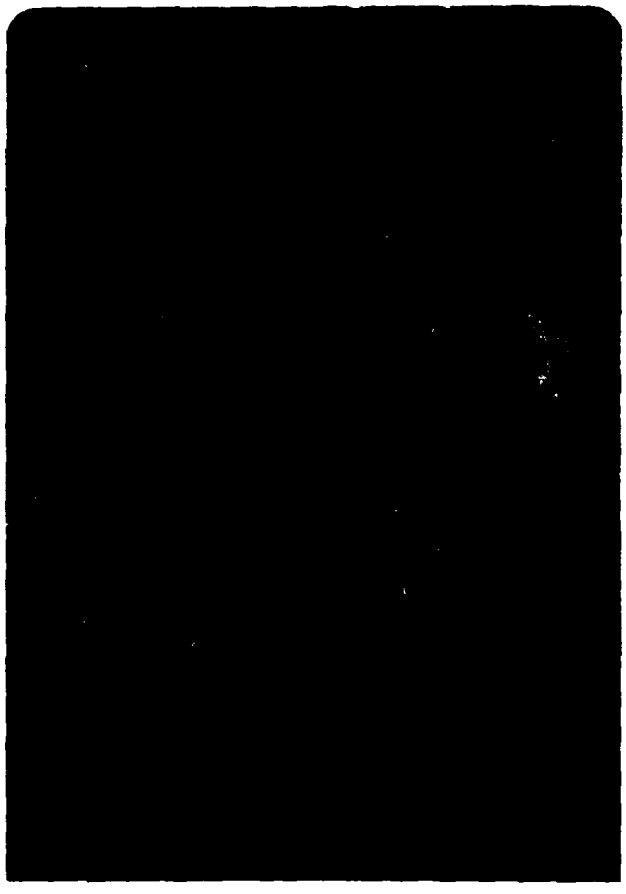

S3
SPILLWAYS

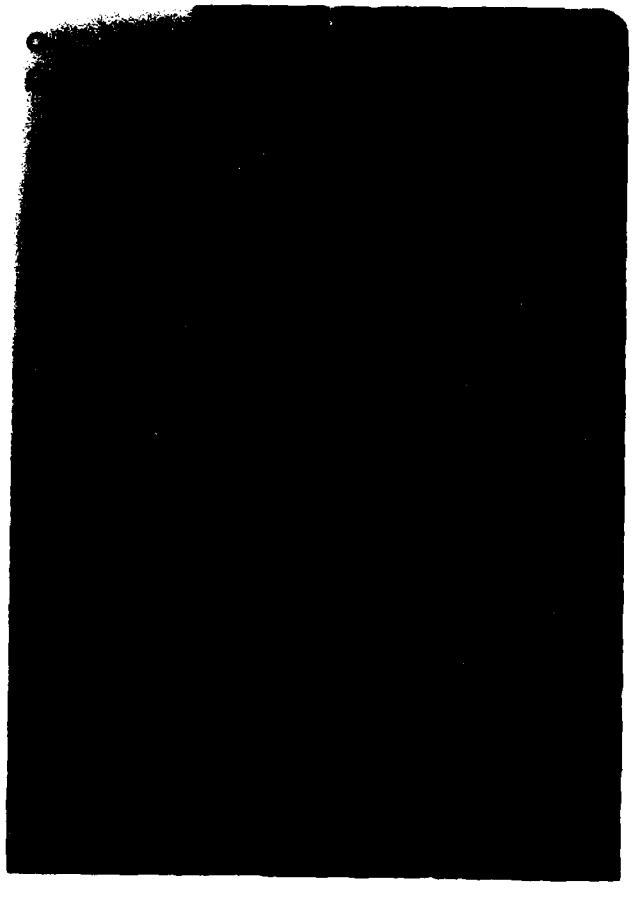
S7

S6

S8







PANORAMA

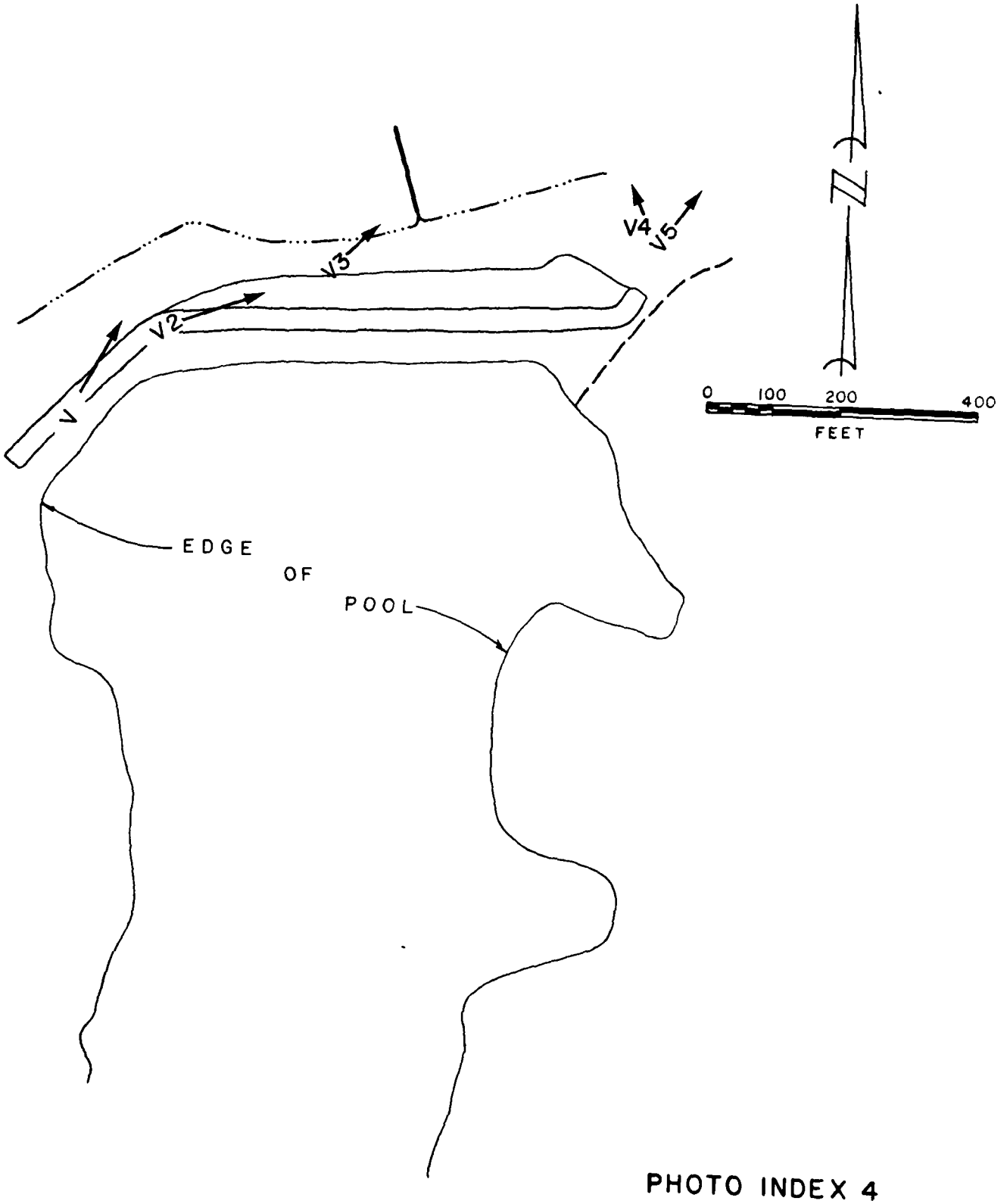


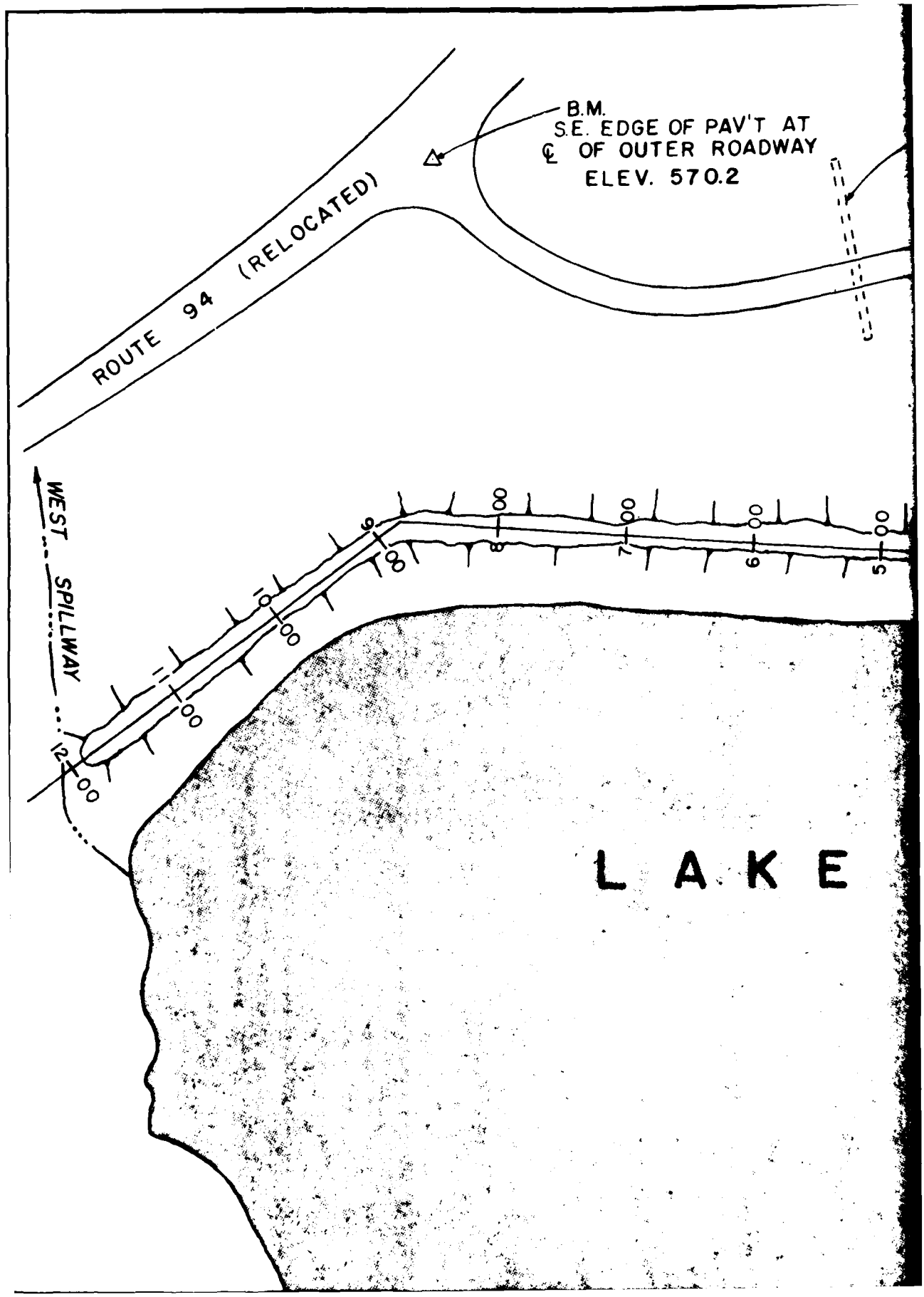
PHOTO INDEX 4
FOR
VALLEY BELOW DAM

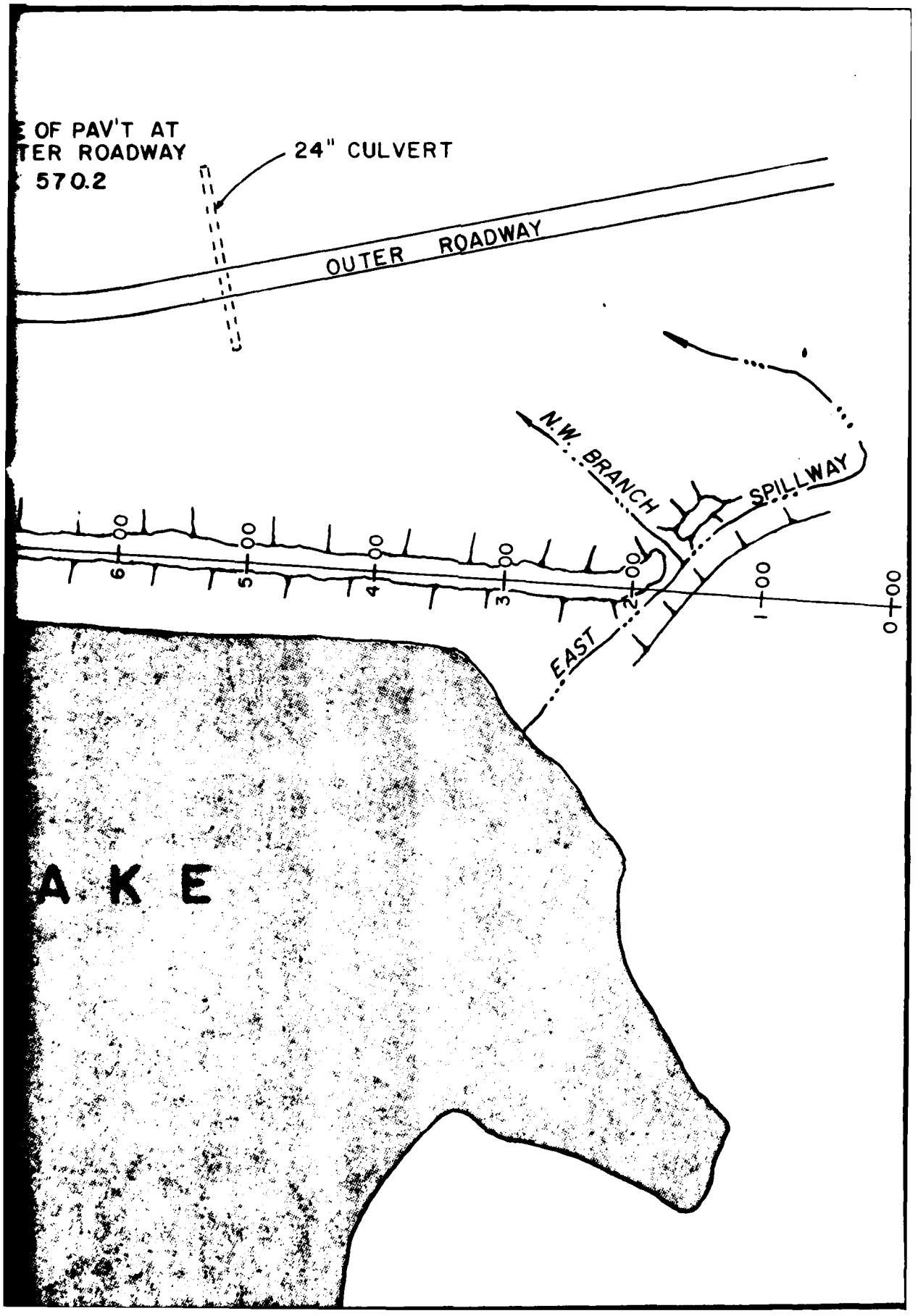
NO NAME - 207
ST. CHARLES COUNTY, MO.
SEPTEMBER 1978

PREPARED BY
REITZ & JENS, INC.

V2
V3
VALLEY BELOW DAM

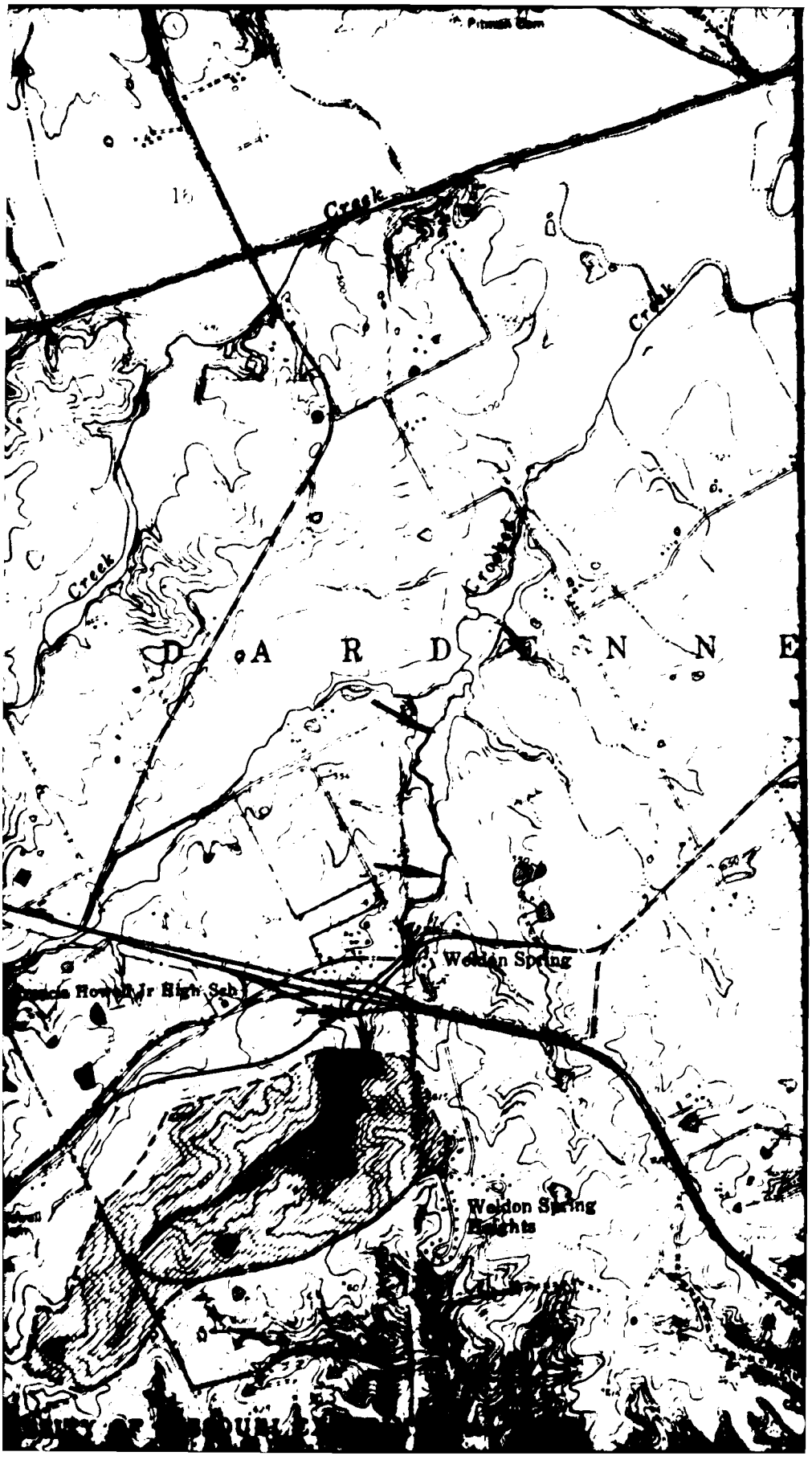

V-5


B.M.
S.E. EDGE OF PAV'T AT
℄ OF OUTER ROADWAY
ELEV. 570.2
ROUTE 94 (RELOCATED)
WEST SPILLWAY
12
9
8
7
6
5
LAKE

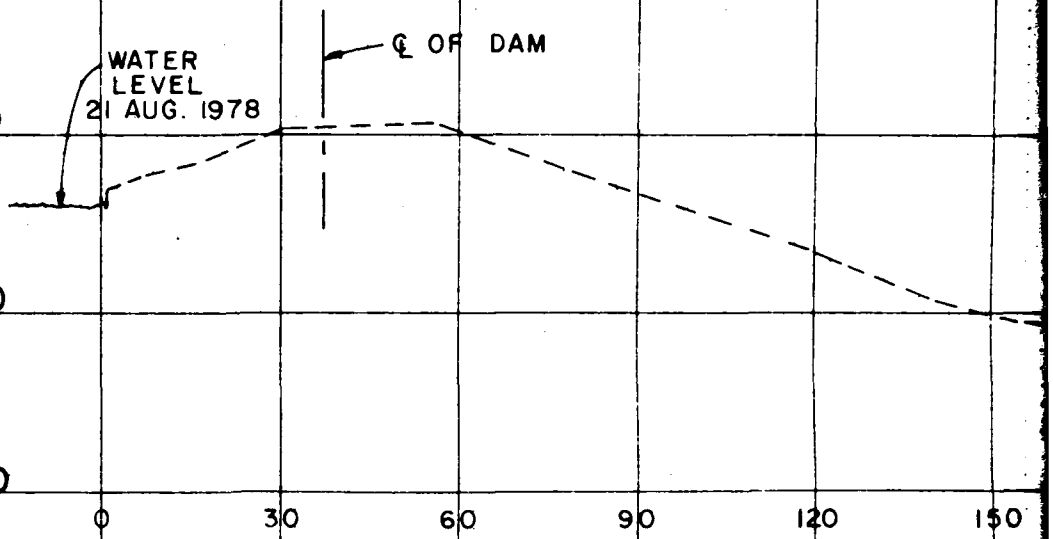

E OF PAV'T AT
TER ROADWAY
570.2
24" CULVERT
OUTER ROADWAY
N.W. BRANCH
SPILLWAY
EAST
6
5
4
3
2
1
0+00
A K E

WATERSHED AND OU

0 1000 2000


Creek
Creek
Creek
D A R D A N N E
Weldon Spring
Weldon Spring Heights

ORIGINAL SURVEY		BY	DATE
	SURVEYED		
	PLOTTED		
NOTE BOOK NO.	TEMPLATE		
	AREAS		
	AREAS CHECKED		



SECTION OF
AT STA. 5

17

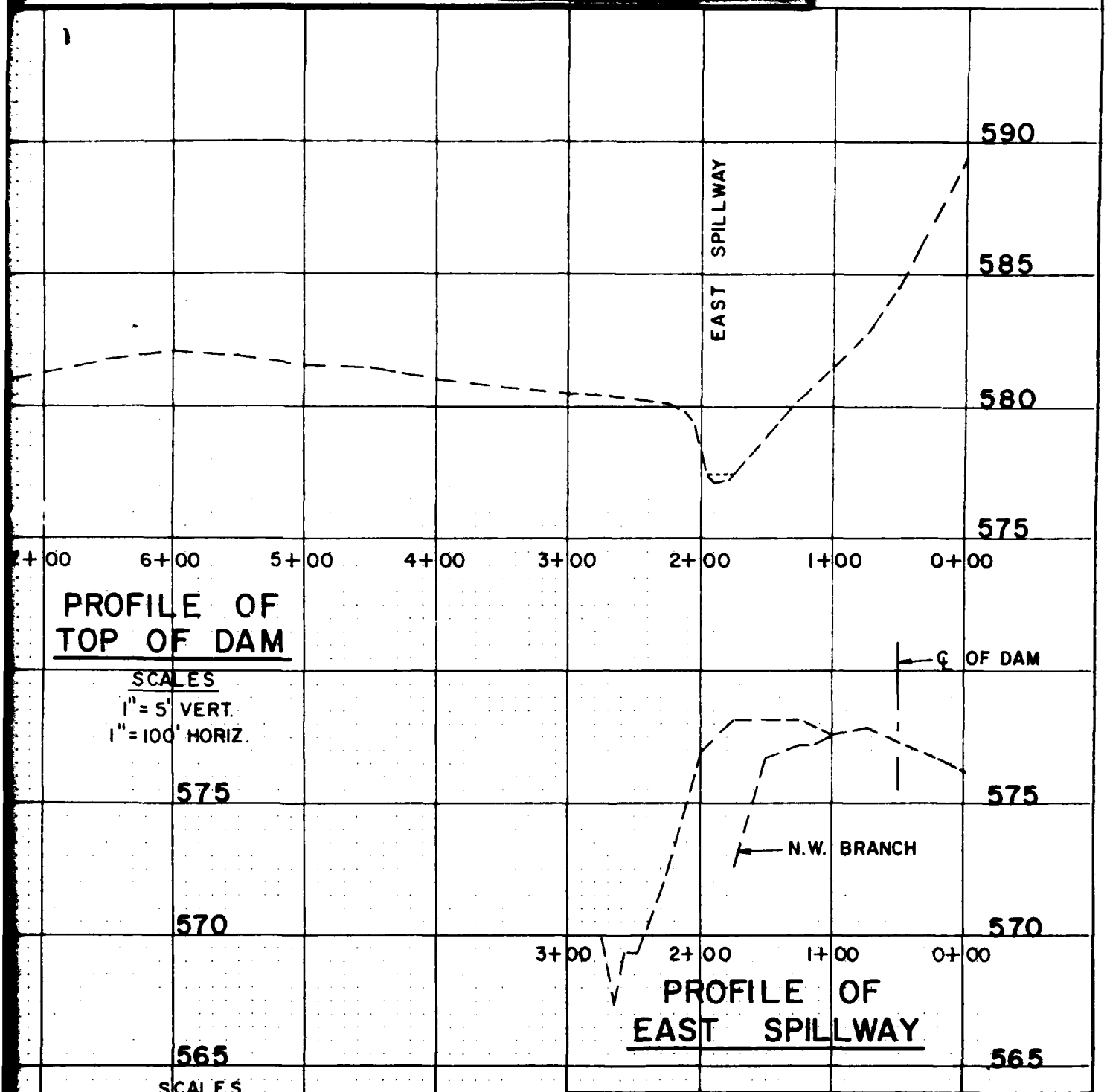
1

SECTION OF DAM
AT STA. 5+00

HIGHWAY FEDERAL AID SHEET
PLATE 4-SINGLE PLAN AND CROSS SECTION-LINE & DOT
TELEDYNE NATIONAL TRACING PAPER
INDIANAPOLIS, INDIANA PRINTED IN U.S.A.

USGS DATUM FROM
MISSOURI STATE HIGHWAY DEPT. PLANS

NO NAME-207



AME-207

PHASE I - INSPECTION
COUNTY I.D. NO. 183
ST. CHARLES COUNTY, MISSOURI

INVENTORY NO. I. D. 10643

FOR ST. LOUIS DISTRICT, CORPS OF ENGINEERS

REITZ & JENS, INC.
CONSULTING ENGINEERS

ST. LOUIS, MISSOURI
SEPTEMBER 1978

PLATE 2


ATE
LMED